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Contributions.

The Economy of Large Cars.

PHILADELPHIA, April 16, 1896.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Mr. A. E. Mitchell has inadvertently fallen into a serious error in his computation of a saving of about \$40,000 by using 80,000-lb. instead of 60,000-lb. cars to transport 1,000,000 tons of freight 100 miles.

The cost of carrying one ton of freight one mile which he used, was based on a train with only 175 tons of lading, and is entirely too high for a load of 1,400 tons. This is evident when he makes the cost of a train-mile \$7.04. The weight of a train has but a minor effect upon the cost of hauling it, so that the cost per ton falls rapidly as the weight of the train is increased.

The simpler and more accurate way to solve the problem would be to determine the cost of running the 43 extra trains required (on Mr. Mitchell's estimate of the weight of the two kinds of cars) by using the 60,000-lb. cars. The most liberal estimate of this cost will fall very much below \$40,000.

It is interesting to note that if the weights of the cars as given by the committee of the New York Railroad Club be taken, the number of trains required will be 741 and 736, or only five trains in favor of the heavier car.

When full loads can always be assured one way there will be a slight saving by using the car having the greater weight-capacity, but it is evident it would prove a loss, instead of a gain, in general traffic as long as the average carload is only from 10 to 12 tons.

JOHN MARSTON, JR.

A Ride on a Compound Locomotive and other Matters.

53 State Street,
BOSTON, April 17, 1896.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Your recent article entitled "A Ride on a Richmond Compound Locomotive" is timely, and one that, I hope, will help to dispel the erroneous idea concerning the behavior of this type of engine for passenger work. The engine, it appears, steams well, and makes a great saving of coal compared with the simple engine in the same work.

I am struck with the enormous size of this engine for the work it performs, and wonder if it is justifiable to use so large an engine.

I was amused to note the apparent surprise of the writer that the engine would start automatically. If he would come to Boston I would show him a compound that will automatically start 30 freight cars every time without fail, and take them off faster from the start than any simple engine of the same weight. Last summer this engine ran on heavy passenger work with trains varying from nine to 13 cars, making 140 miles and 32 stops per day, and it was noted by all the trainmen that she started always better than the simple engine generally used on the train.

Heating Surface.—One of the other matters to which the heading of this letter refers has nothing to do with compound locomotives, but to the relative values of firebox and tube-heating surfaces.

In a somewhat recent article in your columns on improvements in locomotives, the writer refers to the number of times (some seven or eight, I believe) that a square foot of firebox surface is better than tube surface. I know that this is held and often repeated, but it is obviously not true in any important sense. It should not lead anybody in designing a locomotive to make any effort to have large firebox surface. His aim should be to have the grate area needed, and to have as much room for combustion as practicable, in order that the combustion

may be completed before the gases enter the tubes, at which point they will soon be cooled below the temperature of combustion, and go off unconsumed and smoky.

The truth of the matter is that the tubes of a boiler will absorb any heat that comes to them; they cannot absorb what the firebox plates have already taken, and they will do whatever the firebox leaves for them to do. If a firebox absorbed no heat, the tubes would do it all, and just as well as the firebox, but the tubes cannot absorb what they do not receive. A square foot of firebox surface does the most work because it gets the first chance.

And why make any distinction between radiant heat from the fire and any other heat? A pound of coal burnt will generate so many units of heat, and all excepting what is lost up chimney, by radiation, and by loss through the grate, is bound to be absorbed by the heating surface, no matter whether by radiation to the heating surface, or direct contact of hot gases.

This leads me to notice a statement made by Mr. Forsyth before the Western Railway Club some months ago. The statement was that large fireboxes were made for anthracite coal in order to have a large amount of surface to receive radiant heat from the fire. It may be that the man who made the first large firebox for that kind of coal thought that he was making it for that purpose, but what he really made it for was to get a large enough grate to burn coal enough in a unit of time to make the engine steam. Anthracite coal will not burn as fast as bituminous, and therefore a large grate and large amount of coal on it are necessary to liberate sufficient heat to keep up steam. This, I believe, is the sole object of the large firebox.

F. W. DEAN.

The New Railroad Bridge at Niagara.

[WITH AN INSET.]

The old railroad suspension bridge across the gorge below Niagara Falls is to be replaced by a steel arch. This has been under discussion for a good while, and Mr. L. L. Buck, Chief Engineer for the bridge companies, prepared plans and estimates of cost some months ago. Recently an agreement was entered into between the Niagara Falls International Bridge Company and the Niagara Falls Suspension Bridge Company on one side, the owners of the bridge, and the Grand Trunk Railway Company on the other side, as the actual users of the bridge, under which work can be begun at once in building the new structure. Plans and specifications have been sent out for bids, and it is believed that work will be begun this summer.

The existing suspension bridge was completed in 1855. It was built from the designs of Mr. John A. Roebling and under his supervision as Chief Engineer. It was a very remarkable engineering work in its day, and has stood as a monument to the genius of its designer. In 1880 the suspended structure and in 1886 the towers were renewed, from the designs of Mr. L. L. Buck and under his supervision. This work was done without interrupting traffic, and is considered to have been one of the most daring and original things ever attempted by an American engineer. Soon the record of this important work of Mr. Roebling and Mr. Buck will exist only on paper.

General Description.—Bids are called for the construction and erection of the metallic superstructure and for the removal of the present suspension bridge and towers. The masonry foundations and the temporary anchor pits will be prepared by the bridge company.

The bridge will have a main span 550 ft. long between centers of end pins, and will be connected with the top of the bluff on each side of the river by a trussed span 115 ft. long. The main span will be an arch with horizontal upper chords, hinged at the skewbacks, and each truss will have a batter of one horizontal to 10 vertical. The width between the axes of the top chord will be 30 ft.; between the axes of the rib at the crown it will be 34 ft., and between centers of skewbacks it will be 56 ft. 7½ in. The axes of the upper chords will be 134 ft. above the skewback centers, and the axes of the ribs at the crown will be 114 ft. above the skewbacks. One end of each shore span will be hinged to the arch by a pin at the intersection of the end post and top chord of the arch, and the shore end will rest on expansion rollers on masonry abutments. The bed plates of the arch will rest on masonry founded on the rock.

The bridge has two floors, the upper one carrying the railroad tracks and the lower one the highway, sidewalks and trolley track.

Over each post, resting on the upper chords of the arch, will be transverse steel beams. Between these beams, riveted to the webs, will be four lines of longitudinal steel stringers, 7 ft. apart, directly under the railroad tracks. The ends of the transverse beams and of the railroad ties will be covered by a steel plate extending from end to end of the bridge and from the top of the upper chords to the tops of the ties. The hand rails of the railroad floor will be secured to angles along the top edges of these plates.

The lower floor will consist of transverse beams and four lines of longitudinal steel stringers, about 11 ft. apart. The two interior lines of stringers will be riveted to the webs of the beams. The outer lines will be in the planes of the trusses and their ends will be riveted to the posts. Lying across the stringers will be I-beams, which will extend 6 ft. outside of the trusses on each side to carry the sidewalks.

The lateral bracing between the top chords will be stiff diagonals formed with angles riveted to the chords

and to their intersections with the lower flanges of the steel stringers. These will form a continuous system of bracing from shore to shore. Each bent of the arch span will have a web plate secured to each post and tapered to make the inner edge vertical. The vertical edges of these plates will be flanged, with angles riveted to them, and there will be knee braces from these flanges to the lower flanges of the transverse beams of the upper floor. The web plates and their flanges will be riveted to these transverse beams. Each bent of the arch below the lower floor will have a system of sway bracing consisting of steel struts and iron rods extending to the arch ribs. The lateral bracing of the ribs will be entirely of angle struts and lattice.

The crossties of the railroad tracks will be 10 in. × 10 in. × 10 ft., laid 14 in. centers, resting on the longitudinal stringers. Immediately over the stringers resting on the ties will be guard timbers 8 in. × 9 in. notched one inch over each tie, and secured by a ¾-in. bolt at each third tie, passing down through the guard timber and tie and the upper flange of the stringer. Every fourth crosstie will be extended to carry the slats for a walk outside of each track, and a similar walk will be placed between the tracks. Galvanized sheet iron troughs will be placed between the ties to drain the water toward the outside, where it will be received by proper conductors.

The highway floor will be laid on joists 4 in. × 10 in., and the whole carriageway and trolley track to the width of 27 ft. will be planked with 3-in. oak plank laid lengthwise of the bridge. Outside this will be sidewalks laid in 2-in. white pine plank. These will be about 6 in. above the carriageway.

The shore approach to the 115-ft. span at either end will be of plate girder spans, the floor system being similar to that of the main bridge.

Hinges.—The skewback hinges will be made as follows: The ends of the ribs will be formed in the quadrant of a cylinder with surfaces neatly finished. The bed pieces will present an arc of a cylinder of 6 in. greater radius, neatly finished, and between these will be sets of steel rollers formed by taking bars of steel having sections of 1½ in. × 6½ in. and turning them to a radius of 3 in. on the edges. There will be two eye-bars on each side of each skewback passing from the bed to a pin through the rib at the center of motion. The beds will be securely anchored to the rock.

Material.—There will be approximately 400 cu. yds. of earth excavation, 100 cu. yds. of rock excavation, 540 cu. yds. of rock faced ashlar, 111 cu. yds. of broken ashlar and possibly 200 cu. yds. of concrete in the foundations.

In the superstructure there will be 218,000 lbs. of steel castings, 5,560,000 lbs. of steel plates and angles in the form of riveted chords, columns, braces, plate girders and struts; 182,143 lbs. of steel eye-bars and pins and 30,000 lbs. of wrought iron rods and turn-buckles.

The ashlar masonry for the arch foundations, the pedestals of the approaches and the abutments of the end spans will have rock face and pitched joints with ½-in. joints, the mortar composed of one measure of Portland cement and two of sharp sand. The capstones of the skewbacks and of the abutments of the 115-ft. span must be of granite at least 2 ft. thick. The remainder of the stone in the masonry may be of the best quality of Queenston stone or other equally good stone.

The arch supports will be steel castings. The steel for the rollers must have an ultimate strength of 65,000 to 70,000 lbs. per square inch and be well worked. The steel for the plates and angles will be open hearth, with an ultimate tensile strength of 60,000 to 68,000 lbs. and an elastic limit of 33,000 lbs., and an elongation of at least 20 per cent. in a specimen 8 in. long. It must be capable of bending cold 180 deg. to a diameter equal to the thickness of the specimen without cracking. The plates must be rolled from billets or ingots having a thickness of at least 16 times that of the plate. None of the steel shall have over 0.08 per cent. of phosphorus.

Wrought iron will be used for all members on which threads are to be cut or where the member must have an eye formed by welding a loop. This wrought iron will be double rolled from the muck bar. It must have an elastic limit of at least 26,000 lbs. and an elongation of at least 15 per cent. in 8 in. and must be capable of bending 180 deg. around a diameter 1½ times the thickness of the specimen without cracking. The riveted work will be of steel with steel rivets. Where holes are punched they must be ⅓ of an inch less in diameter less than the cold rivet, then assembled and reamed. Plates too thick for punching will be assembled and drilled. The punch must be ⅓ of an inch less in diameter than its proper die. Before final assembling faces that are to be inaccessible must have a coat of red oxide paint and boiled linseed oil. No drifting will be allowed and the rivets must be machine driven where possible.

The upper chords of the arch will have a camber such that at the minimum temperature with a maximum load it will not go below a straight line joining the two ends of the arch span. Extreme accuracy in the lengths of all the members of the arch and their abutting ends will be necessary.

Erecting.—The end spans and the first panels and post of each end of the arch will be erected on scaffolding. The end spans will be connected with the end post of the arch and, by means of the approach girders, with the temporary anchorage, and then the two parts of the arch will be built out by cantilevers. As the present bridge will continue in use during construction the upper floor beams of the arch must be left out until the old suspender's superstructure can be raised high enough

to permit the new beams to be inserted under the upper chords of the old structure. During this time the old structure will rest on the lower floor beams of the arch bridge, and consequently the cables of the old bridge can be taken apart and removed and the towers can be taken down. The suspended structure must then be pushed far enough to one side to permit a track to be laid on one pair of the new stringers, after which the old superstructure can be taken apart and removed and then the other track laid and the bridge completed. As the new bridge will have the weight of the old suspended structure and its trunks to support before the upper beams can be inserted it is probable that the upper chords will need to be temporarily braced against the old structure until the beams and stringers are in place. During erection it will be difficult to use a traveler, as the old bridge is in the way. It seems best to use a couple of heavy wire ropes over the towers with trolleys to carry out the material. Cages for the men can be suspended from the old bridge wherever required.

Loading.—The bridge is designed to carry on each railroad track a load of two locomotives, with four pairs of drivers each and 40,000 lbs. on each pair, followed by a train of 3,500 lbs. per foot; that is, 7,000 lbs. live load on that floor. It is designed to carry in addition a live load of 3,000 lbs. per running foot on the lower floor, making 10,000 lbs. live load in all. It will be seen that the whole forms an unusually heavy load.

The diagram showing wheel loadings adopted is given herewith, as are drawings of various details of the structure. The general elevation and plan of the structure, with further details, are shown on the inset sheet with this issue.

The Nicaragua Canal Bill.

The bill to give the Government guarantee to the bonds of the Maritime Canal Company of Nicaragua may safely be added to the list of measures killed by the policy of inaction which has been adopted by the present Congress. There has never been more than a languid interest in the measure among the members who were in the confidence of the party managers because they have felt that a bill increasing the public debt, in the form of a guarantee, by \$100,000,000 would not be allowed to become law. The sincere friends of the bill have kept up a semblance of activity, with the intention of taking advantage of any opportunity for its passage which might come their way and with the intention of at least washing their own hands of responsibility for its defeat. They have given hearings before the committees of both houses, at which Warner Miller and other perennial champions of the bill have appeared, and the sub-committee of the House Committee on Commerce have reported the bill back to the full committee. A vote will be taken on April 24, but, even if the bill is reported to the House, it is likely to slumber on the calendar without action. The committee have plenty of other business to attend to and the leaders of the majority party probably understand very well that the increase of the bonded debt by Congress would take out of their mouths the arraignment of the present Administration for increasing the bonded debt for more necessary purposes. If the house fails to take any action at the present session, as seems to be settled, the doom of the bill for the present Congress is practically sealed. The House may rush it through early next December, but a few resolute opponents of the measure in the Senate can easily defeat it.

The Nicaraguan Canal bill, in the ordinary course of events, will not pass the House at the present session of Congress and has small chance of becoming a law at any time during this Congress. This throws it over for two years, until the long session of the Fifty-fifth Congress, in the summer of 1898—*Washington Correspondence of the Journal of Commerce.*

If this forecast is correct the best thing for the real friends of the canal enterprise to do is to urge a bill to carry out the recommendations of the Engineer Board; that is, to have an appropriation made for further studies. Indeed for three or four years it has been evident to the real friends of the canal that this was the only safe and business-like course to pursue. One must discriminate carefully, however, between the friends of the canal as a project, and the friends of the canal company and of those wishing to float a bankrupt enterprise on the credit of the nation. We may add, however, that we have very grave doubts of the correctness of this correspondent's prognosis, even though he is an unusually well-informed man. The combination of interests—financial and political—to push the bill is very strong.

Electrical Equipment of the Burlington & Mount Holly Branch of the Pennsylvania Railroad.

The branch of the Pennsylvania Railroad extending from Burlington, N. J., to Mount Holly, N. J., about nine miles, which was previously worked by standard Pennsylvania Railroad steam locomotives, was changed to an electric line last summer, and we have described the rolling stock and overhead construction, but nothing complete has ever been published about the motors. A description of these we are now able to give.

The electrical equipment has been a success from the start and is giving complete satisfaction. The track and roadbed are of standard Pennsylvania Railroad construction. The rail joints are bonded and two supplementary wires are used for the return circuit, one alongside each rail. The trolley wire is No. 00 hard drawn copper, and is suspended 22 ft. above the track by span wires supported by chestnut poles on each side of the track. There are two feeders each having a cross-section of 500,000 C. M.; one runs the whole length of the line and the other about six miles.

The power plant is at Mount Holly. It comprises a 300 H. P. Climax boiler and a "Kodak" outfit consisting of a Westinghouse 18 in. and 30 in. x 16 in. compound automatic engine operating a 250 r. p. m., direct con-

nected to a 225 k.w., 8 pole, Westinghouse railroad generator.

There are three motor cars in operation, all of which are combination baggage and passenger cars. They were built especially for this service by the Jackson & Sharp Co., of Wilmington, Del. The car bodies are 35 ft. long, and the total length over platforms is 43 ft. 6 in. Each motor car is capable of drawing standard P. R. R. coaches at a speed of from 45 to 60 miles an hour. The wheels are 36 in. in diameter.

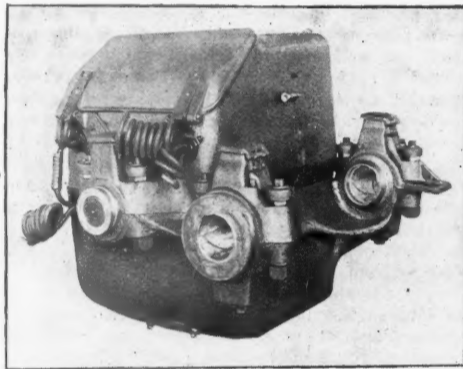
The motors were built and installed by the Westinghouse Electric & Manufacturing Company. One car is supplied with four standard No. 38 50-H. P. railroad motors, and is capable of maintaining a speed of 45 miles per hour. The other two cars are each equipped with two special 75-H. P. motors, one on each truck. Although rated at 75 H. P., these motors are capable of developing 100 H. P. each. The speed of one of these cars is 45 miles an hour, and that of the other is 60 miles an hour; the difference in speed is accomplished by a different gear ratio, the number of teeth in the cast steel gears and pinions being as follows:

45-mile car.	60-mile car.
Pinion..... 17 teeth	Pinion..... 24 teeth
Gear..... 93 "	Gear..... 36 "

The accompanying engravings show the special 75-H. P. motors, which are series wound and have four poles. The upper and lower poles only are provided with field coils, the other two being consequent poles.

The field castings form a complete casing within which the field coils, armature, commutator and brushes are protected from dampness and dust. For convenience in cleaning the brushes and commutator, an opening has been provided directly over the commutator; this is closed by a spring lid. There are hand holes in the lower field casting, closed by air-tight coverings.

The armature is of the drum type, slotted to receive the machine-wound coils. The core is built up of thin steel discs, and is of the ventilated type; that is, there are air passages provided through the core parallel to the shaft, thus preventing excessive heating in the core.



75-H. P. Electric Motor—P. R. R.

The coils are separated at the ends of the core by air spaces, and are so placed as to greatly facilitate the dissipation of heat. The wires of each coil are separately insulated, and the coil as a whole enclosed in a protecting cell of fullerboard and mica. There are 61 slots in the armature.

The commutator is built up of 183 drop-forged copper segments, insulated from each other by mica. The armature is connected so as to produce a two-circuit winding. The brushes are placed 90 deg. apart on the upper side of the commutator.

Each car is provided with two series-parallel controllers of the commutator type. The diverters are placed under the car as usual. Hand circuit breakers are used in place of canopy switches at each end of the car. Two trolleys, one behind the other are placed on each car. These are of standard Nuttall manufacture, but the poles are extra long.

The cars are equipped with special air-brake outfits furnished by the Westinghouse Air-Brake Co., the air pump on each end being operated by a special electric motor built by the Westinghouse Electric & Manufacturing Co. The air pump is provided with a suitable governor which automatically operates a rheostat to shut off the current to the motor driving the pump when some predetermined air pressure has been reached in the main storage reservoir and again automatically starts the motor when the pressure has been reduced a moderate amount.

The cars are heated by electric heaters furnished by the Central Electric Heating Co., of New York. These heaters are controlled by a switch so as to emit different degrees of heat as required.

The Air-Brake Men's Association.

(Continued from page 267)

The session of Wednesday.—The meeting was called to order promptly at eight o'clock by President Hutchins, and the report of the Committee on Progressive Questions was briefly disposed of by being accepted without discussion and with a few amendments that had been made in committee. This report cannot fail to be of great value to those who are studying the action of the air-brake. It is in the form of a catechism, and occupies more than 60 pages of the printed proceedings, covering

the whole range of practice and forming a very complete treatise on the subject.

The first report read at this session was that on the Water Raising System on Sleeping Cars. The report is by Messrs. Jesson, Houchin, Nellis, Fairchild, Alexander, Conger and Young, and it is a very clear and complete document. An abstract follows, omitting the engravings.

THE WATER RAISING SYSTEM ON SLEEPING CARS.

Although the water raising system is only an alien and a parasite, the fact that it is frequently responsible for certain erratic and apparently mysterious actions of the brakes demands that it should be as thoroughly understood by air-brake men as though it were a component part of the air-brake system. A design which causes pressure to be taken from the air-brake system at an inopportune time, or one that, through slipshod methods of maintenance, will permit air pressure to return and will allow water to leak into the brake system, is a serious menace to safety.

Instead of following up the development of the water raising system through its numerous minor changes, it is believed advantageous to combine and treat it under the four separate heads, as follows:

First Method.—The simple hand-pump was abandoned in favor of this method. The pressure was taken direct from the train pipe, and passed through the supply pipe, drip cup and automatic valve to the air tank, entering at under side and passing out through connecting pipe and check valve to the upper side of the water tanks. Thus an air pressure was had on the top of the water in the tanks, which forced the water out at the bottom through the water tank connecting pipe to the supply pipe up inside of the car. The air and water tanks, which had capacities about equal to an ordinary main reservoir, were served with pressure at the same time the auxiliary reservoirs of the brake system received their supply; the engineer, in the meantime, no doubt wondering where all of his pressure was going. Possibly at the end of the trip he reported on the roundhouse repair book the familiar phrase, "Pump won't make air."

Check valves and the automatic valve were designed to prevent the return of pressure from the air and water tanks to the train pipe, but experience proved they were inefficient under unfavorable circumstances, such as dirt collecting on their seats, and, in consequence, the brakes were released by the air-tank pressure leaking back through the valves, and increasing the train-line pressure after the brakes had been set. This trouble first manifested itself on mountain grades where it was necessary to hold on brakes for long distances. Complaints came from the engineer that some certain opposing influence was working against him which would mysteriously release his brakes shortly after he applied them. Water also leaked back into the air brake system, frequently freezing up the triples and partially or wholly obstructing the passage of air in the train-pipe. The gravity of the situation was truly alarming.

Second Method.—This system is somewhat similar to the first one; yet considerably different from it. Pressure is still taken from the train pipe, but it is done in a little different manner; and, according to instructions, by opening the shut-off cock only at such times that the train may be stopping for several minutes at a station. One forward step, however, is made in the recognition of the fact that pressure must not be taken from the air-brake system at any and at all times.

Several cocks are located in the proper pipes and connected to the lever L, so that when the latter is pulled out to refill the water tanks, communications between the air tanks and water tanks, and water tanks and distributing pipes will be closed; and the supply pipe to the water tanks, and water tanks through the vent pipe to the atmosphere, will be open. When the lever L is pushed in the combinations will be reversed. Regulator R is interposed in a pipe between the air tank and water tank to reduce the force of the water delivered at the basins inside of the car, and thus prevent splashing of the water when the faucets are opened. There is a shut-off cock between the train pipe and water raising system that must be kept closed while the train is running, and can be opened to replenish the air tank when the train is standing still. If the instructions, which required that the shut-off cock should not be opened while the train was in motion, had been strictly adhered to, this system would have been fairly satisfactory. The shut-off cock was too easy of access, however, and the hand-pumping process too tedious to permit of this rule being obeyed; and when pressure was low in the water system, either from leakage in the pipes, neglect to charge at the proper time, or unusual amount of water used, the conductor and porter would frequently resort to the shut-off cock, regardless of the order issued and the effect had upon the brakes. Many engineers will doubtless recollect instances when their train was mysteriously brought to a standstill which investigation failed to provide a reason for, but which could have been traced to the stop cock had the sleeping car employees been honest. Sometimes the thieves were sufficiently skillful to make the steal without being detected; while others opened the cock suddenly, not knowing what the result would be, and thereby made an emergency application of the brakes.

The regulator was erratic in its action, and would frequently close of its own accord, shutting off the air pressure necessary to raise the water to the basins.

Third Method.—The pressure in this system is taken from the auxiliary reservoir, passes through the air-pressure governor valve to the air tank, thence through the reducing valve to the water tanks. The air-pressure governor valve is adjusted at 60 pounds, and will not permit the diaphragm valve to unseat until that amount has first been accumulated in the auxiliary reservoir, thus depriving the water system of pressure until a sufficient charge has been accumulated with which to test brakes. The reducing valve replaces the regulator in the second system, and is adjusted to permit but 20 pounds pressure in the water tanks. The feed port in the triple valve restricts the passage of air from the train pipe to the water raising system, and the air-pressure governor valve prohibits pressure from passing to the air tanks until a sufficient amount to test brakes and operate them under ordinary conditions has been accumulated in the auxiliary reservoir.

This is a good design, and while not entirely free from objections, its superiority over the preceding forms will be recognized. With the air-pressure governor valve and the reducing valve in good condition, but one objection can be raised against it, viz.: With the auxiliary reservoir charged to 65 or 70 lbs., and a light reduction in train pipe pressure be made to apply the brakes before the air tank has fed up to about 60 lbs., the feed from the auxiliary reservoir into the air tank will continue, and thereby "bleed off" that brake. With the present inefficient system of inspection and maintenance of the water system, however, this design is capable of committing more costly and serious depredations than the former methods. Should the non-return check valve in

the air-pressure governor valve seat improperly, the air tank will have a direct communication with the auxiliary reservoir, and, by adding its volume to that of the latter, will cause skidded wheels.

In one of the largest terminal passenger yards in the country, a prominent inspector informs the committee that in nearly every instance where wheels are removed from sleeping cars on account of being skidded, he almost invariably finds this valve seating improperly, and that he remedies the trouble by a few minutes' work. Private car lines and railroad companies might bear this in mind when settling claims. Water will also leak into the auxiliary reservoir, with the usual consequences, if the valve seats poorly.

Fourth Method.—Thus far, no material changes have been made in the water supply system—all changes having been confined to the air-pressure system.

The air-pressure governor valve and the reducing valve are the same in this system as in the preceding one; but with the single tank system a very considerable change in the water supply system is made. Economy in space, on account of gas tanks and other modern appliances being added under the cars, has made it necessary to combine into one the volume of the three former tanks used, and to place it tandem with the air tank. The lever and its attachments are abandoned, and a combination cock, with two separate passages through its key and six connections leading from its body, is used in its place. A shaft and bevel gear are used to rotate the key.

The design of the combination cock is mechanically weak, and wear will allow the water and air pressure to mingle, but so long as the valve seats properly the trouble thereby caused will be confined to leakage, which, of course, must be supplied by a tax on the air pump of the locomotive. If the valve does not seat tightly, the leakage in the combination cock will undoubtedly result in large quantities of water going to the auxiliary reservoir, as experience has proven.

Conclusion.—The water-raising system cannot be called a success until a system of inspection and maintenance shall have been established, whereby water and back pressure will be prohibited from leaking into the air-brake system. The present system of inspection and maintenance, if any system can be said to truly exist, is inefficient. Observations have failed to bring to light any instance where systematic attention is paid to the pressure valves of the water-raising system from the time the car leaves the shop until it returns. It is also a noticeable fact that the employees, to whom is intrusted the maintenance of the water system, have an inferior knowledge of the air pressure part of it. The air pressure governor valve and the reducing valve are frequently hidden in some almost inaccessible place. One inspector reports having been obliged to saw a hole in the wooden casing of the air tank in order to reach the valves; and that on several occasions he found the mechanism of the reducing valve so badly corroded that it crumbled to pieces in his hand.

It is important that the reducing valve be kept in operative condition; it should be adjusted and kept at 20 lbs. Besides causing the splashing, which is an annoyance to passengers, the high pressure on the water tanks is an extravagance which must be met by an extra tax on the air pumps. A duplex gage should be located in the washroom of each car, and the red hand connected to the air tank pressure, and the black hand to the water tank pressure. Some railroads have required a single gage to be placed in the car, but unless attached to the water tank pressure it is of no practical use whatever.

Troubles, Their Symptoms and Cures.—Should air pressure escape, but no water be obtained when the faucet is opened, water tanks are empty. Refilling will correct.

Should no air pressure and no water escape when faucet is open, first examine the cut-out cocks in the water system, then examine the air pressure governor valve and reducing valve, and the water strainer. Be sure all cocks are open.

When a weak flow of water is had, examine the pressure reducing valve first; then other points as per the preceding paragraph.

A strong flow at the basins, causing splashing, is caused by too high pressure on the water tanks. Examine reducing valve; it probably needs adjustment or cleaning.

Recommendations.—In conclusion, your committee would make the following recommendations:

1st. That all water-raising systems use the first and second methods be changed to the third method.

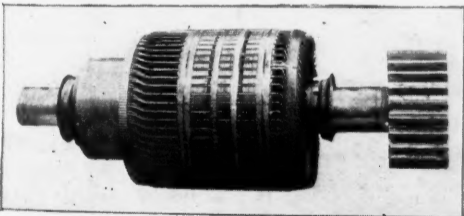
2d. That a duplex air gage be placed in the washroom of all sleeping cars using the water-raising system, and that the red hand be connected to the air-pressure tank, and the black hand to the water tanks.

3d. That the reducing valve be regulated to permit but 20 lbs. of air pressure on the water tanks.

4th. That the air pressure governor valve and the pressure reducing valve be given a more accessible location, and that "Governor Valve" and "Reducing Valve" be plainly stenciled on the door of the box containing them.

5th. That the air tank be drained by removing the drain plug each trip.

6th. That special attention be given to the proper seating of non-return check valve 5.



Armature for 75-H. P. Westinghouse Electric Motor—P. R. R.

7th. That the combination cock be kept ground in, and the water valves and pipes be kept tight.

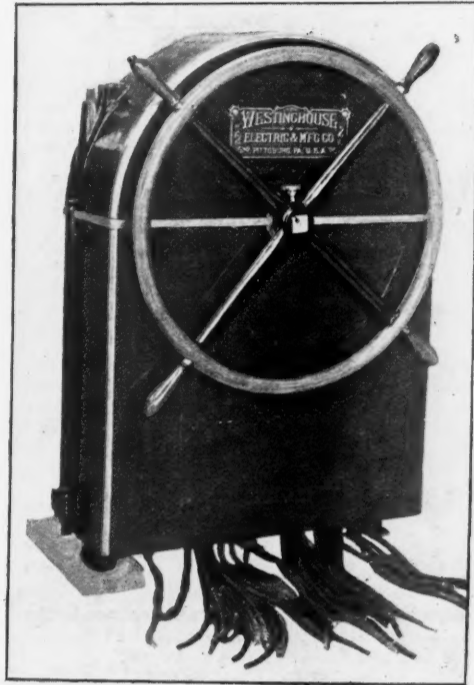
8th. That a card of instructions be issued for the information and government of employees whose duty it is to care for the system.

9th. That an efficient system of maintenance be inaugurated that will insure the air-brake system from interference of the water-raising system; for your committee believes that by such measures only can the present relationship between the water-raising system and the air-brake system be safely continued.

In reviewing the paper at the opening of the discussion the chairman of the committee, Mr. Jesson, said that so many changes were being continually made not only in the methods of doing the work, but in the arrangement of the piping that it was almost impossible for a man to keep abreast of all that is done. But the worst of it is that the location of valves and the connection of the

piping is done with an absolute disregard of the work that the repair men of the air-brake force may be called upon to perform.

Mr. Nellis echoed this complaint and said that, of all the men in railroad service, he thought that the Pullman employees had the least understanding of the connection between the water raising system on the sleeping cars and the air-brakes. Referring to the first and second systems described in the paper, he said that on the Northern Pacific they had had considerable difficulty with brakes releasing on grades, and that the trouble lay in the fact of the principle of the design being at fault. Then, too, repairs are not well made. Pipes that



Controller for Electric Cars—P. R. R.

have burst have been found packed with hemp, and many of the valves are kept in service even after they are leaking badly. But since the fourth system came to be used regularly the trouble has decreased, but it is still a source of annoyance, and unless it is properly put up and maintained, it is possible for the auxiliary reservoirs to become half filled with water as the result of leaking back. The Wagner company do not use any such system, but place their tanks upon the top of the car and depend upon gravity for supplying the basins.

Attention was particularly called to the network of pipe existing under cars where steam heat is used. It was especially urged that some uniform method of piping and making attachments be adopted so that inspectors might be able to know where to look for parts that have given signs of trouble. As the work is done now, certain valves may be in plain view beneath the car; they may be in the box holding the tanks, or they may be between the floorings and only accessible through a trap from the interior of the car.

The question was asked regarding the effect of the carburettor light system upon the brakes, and it appeared from the testimony given that it is liable to set the brakes when there is a leakage of the valves causing an undue lowering of the pressure in the train pipes, but that the difficulty is readily remedied by putting in a new rubber packing.

The report on the Economical Lubrication of Air Brake Cylinder was next read. This was made by Messrs. Marshall, Cota, Burgess, Synnesvedt, Carney, Hahan and Cory. An abstract follows.

ECONOMICAL LUBRICATION OF AIR-BRAKE CYLINDERS.

It will be evident to everyone who has given the subject much attention, that the cost of lubrication of car cylinders is affected not only by the frequency of oiling and cleaning them, the kind of lubricant employed, and the methods of oiling, but also by the location of cylinders and general arrangement of those parts of the brake gear adjacent to them. Each of these items will be duly considered.

The time required for oiling and cleaning a 10-in. passenger cylinder and an 8-in. freight cylinder put up in the usual manner, has been found by actual trials, conducted by one member of your committee, to be as follows:

One 10-in. passenger cylinder, $\frac{1}{4}$ hour labor.....	\$0.12
Oil.....	0.004
Total.....	\$0.124
One 8-in. freight cylinder, $\frac{1}{2}$ hour labor.....	0.08
Oil.....	0.004
Total.....	\$0.084

Another member of the committee has found that with wages at 16 cents per hour, "Renown" oil at 22 cents per gallon, kerosene to cut the gum at 6 $\frac{1}{2}$ cents per gallon, waste 5 $\frac{1}{2}$ cents per pound, the average cost per freight car is 9 cents, and per passenger car 11 $\frac{1}{2}$ cents. From still another source we find that with a machine for removing and putting up the cylinder head, and with more intelligence employed than we could expect from men paid but 16 cents per hour, the time required, as mentioned above, can be reduced one-third, but with the class of employees doing this work, and with labor and materials at the prices quoted above, the average cost may be placed at about 9 cents for freight cylinders and 13 cents for passenger.

One of the most important phases of the subject assigned to this committee is this one of the time which should elapse between oilings and cleanings of cylinders. In a report on air-brake and signal instructions, presented to the Master Car Builders' Association in 1891, but not adopted by that body, it was recommended that cylinders, both freight and passenger, be cleaned once every six months and oiled once every three months. In 1892 the committee made a revised report, which was adopted by the Association, and which contained a paragraph on cleaning cylinders and triple valves that read in part as follows:

"The brake cylinders and triple valves must be kept clean and free from gum. They must be examined for this purpose as often as once in six months upon passenger cars, and once in 12 months upon freight cars. The cylinders must be oiled once every three months, by removing the plug from the hole in the cylinder head for this purpose, and inserting about one-twelfth of a pint of mineral oil, and the dates of last cleaning and oiling marked with chalk upon the cylinders in the places left for such dates."

This is the rule which the railroads are supposed to be following at present, though we very much doubt if in freight service its provisions are fully met.

It is seldom if ever advisable to oil a cylinder without having first cleaned it. The reasons for this, briefly stated, are that oil inserted through the hole provided for that purpose lodges on the cylinder and piston heads and most of it goes at once to the bottom of the cylinder to join the residue from the previous oiling; it does not lubricate the walls of the cylinder. Furthermore, there is no way of telling how much oil is already at the bottom of the cylinder, and the additional quantity inserted may be sufficient to cause the oil to overflow into the triple valve, where it does damage in rotting out the rubber valve seats. It has been suggested that oil would be prevented from flowing back to the triple by changing the location of the oil plug to a point below the port from the auxiliary, but your committee does not concur with this recommendation, as it does not believe the oil plug should be used at all for oiling, though it should be retained because of the convenience it affords for attaching a pressure gage, or for removing a neat-fitting piston when the triple valve happens to be in a position to exclude the atmosphere.

To show the financial importance of the question of time between cleaning and oiling, we have computed the cost of keeping a freight car cylinder lubricated according to the Master Car Builders' rule, and also when they are oiled and cleaned once in six months and once in twelve months, with no oilings between cleanings:

(1) M. C. B. Rule. Cleaned once every year, oiled every three months:	
One oiling and cleaning.....	\$0.09
Three oilings (at 1 $\frac{1}{2}$ cents each).....	0.045

Total per year per car.....	\$0.135
Cost per year per 1,000 cars.....	135.00

(2) Cleaned and oiled every six months:	
Two oilings and cleanings, at 9 cents.....	\$0.18
Total per car per year.....	0.18
Cost per year per 1,000 cars.....	180.00

(3) Cleaned and oiled every 12 months:	
One oiling and cleaning.....	\$0.09
Total per car per year.....	0.09
Cost per year per 1,000 cars.....	90.00

If from these figures we determine the total annual cost of lubricating and cleaning the 300,000 cars now equipped with brakes, and the 1,000,000 cars that will ultimately be so equipped, the results are as follows:

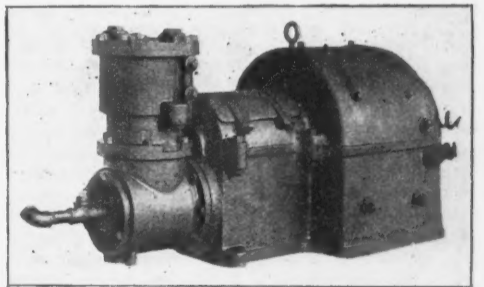
	No. 1.	No. 2.	No. 3.
300,000 cars.....	\$40,500	\$51,000	\$27,000
1,000,000 cars.....	135,000	180,000	90,000

From these figures it will be evident that the adoption of a shorter period between cleanings than actually necessary is going to cost railroads quite a sum.

After duly weighing all the information in our possession, we have come to the conclusion that a freight cylinder on a car in average service, if thoroughly cleaned and lubricated with a heavy bodied oil or a suitable grease, can be allowed to run one year without further attention.

For passenger cars the committee believes that while the same period of one year might safely be allowed to elapse between oilings, there is not the same necessity for a general rule regarding them. But while we feel that a general recommendation may not be required, we would, in the interests of economy, suggest that passenger cylinders be oiled and cleaned not oftener than once in six months and at least once in 12 months.

We have already referred to the necessity of using a suitable lubricant. Light bodied oils are wholly unsuited for the lubrication of brake cylinders, except possibly in severe winter climates. What is usually required is either a heavy bodied oil or a grease that will not become too stiff in cold weather. Such oils and greases remain on the walls a long time, and postpone the time when the lubricant will go to the bottom of the

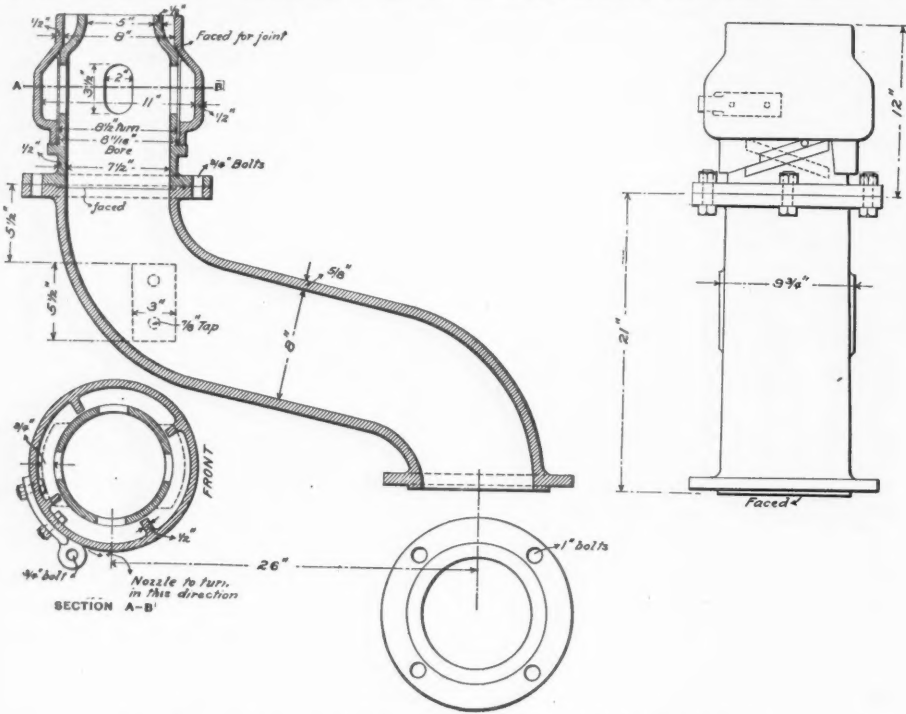


Special Electric Motor and Air Pump—P. R. R.

cylinder and leave the upper portions wholly dry. Oils of the consistency of signal oil (used quite frequently) are not suitable, and even common black oil is but little better. Cylinders lubricated with West Virginia well oil, which is considerably thicker than signal oil, have been found bone dry at the top in as short a time as two months. Valve oil, though expensive, is used on many roads, and while your committee is not prepared to recommend this or any other particular grade, we do believe that no oil lighter than valve oil should be employed. The manufacturers of air-brakes use an excellent grease that seems to be all that is required, but its cost is considerable, and this might prove an obstacle to its general use by railroads. Various firms manufacturing lubricants have recently turned their attention to the requirements of the air-brake service, and it is probable that railroads will soon have the choice of several oils and greases that will be inexpensive and but little affected by changes in temperature, and that will not gum within the periods

between cleanings we have mentioned. But if satisfactory results can be obtained from a cheap lubricant, it will certainly pay to use a costly one, for the expense of lubrication is chiefly labor. If at present the cost of oiling and cleaning a freight cylinder is nine cents, of which one-half cent is for oil, it will evidently pay to use an

Local conditions were recognized as having an important influence both on the time allowed to elapse between oilings and the kind of lubricant to be employed. On sandy roads the girt will be drawn into the cylinder and so clog and cut it, that it may be necessary to give



Exhaust Pipe—Schenectady Switching Locomotive, for Grand Central Station.

expensive lubricant that will keep the cylinder and packing in condition for one year, rather than to retain the cheap oil and be compelled to overhaul the cylinders every three or six months.

The location of cylinders and adjacent parts of the brake gear has a great influence on the cost of cleaning and lubrication, and, while it may be considered a problem for the designer, the matter is too important to be passed without mention here. On common box, stock and flat cars there is not much to complain of. The most inconvenient locations are generally found on hopper cars and other special equipment, and if the extra cost of lubrication thereby entailed were known to the designers, we think more care would be shown. Your committee has knowledge of one class of cars on a Chicago road on which the cylinder heads project into the needle beams, and the cylinder must be taken down to be cleaned. The cost of cleaning and oiling one of these cylinders varies from 45 cents to 60 cents, or from 30 to 51 cents more than it would cost if the cylinders were as accessible as the average. We don't know how many of these cars the road owns, but if it has 1,000 of them the cost per year for their lubrication, if cleaned only once in that period, is somewhere between \$450 and \$600, instead of the \$90 it should cost, to say nothing of the greater number of air-tight joints that must be broken each time.

Conclusions.

In conclusion, we would sum up our recommendations as follows:

- 1st. Air-brake cylinders on freight and passenger cars should never be oiled without at the same time being cleaned.
- 2d. Freight brake cylinders should be cleaned once every 12 months and oiled with a heavy oil or grease that is but little affected by changes in temperature, and will not gum within the period mentioned.
- 3d. Passenger brake cylinders should be cleaned and oiled with a heavy oil or grease at least once in 12 months, and not oftener than once in six months.
- 4th. While not absolutely necessary, there is an advantage to be gained in giving the piston a one-half turn every six months.
- 5th. Greater care in the location of air-brake cylinders on freight cars, particularly coal, ore and other special cars, would result in a large reduction in the cost of cleaning the same.

The discussion of this report turned chiefly on the frequency with which such cylinders should be oiled and cleaned, and it was pretty well agreed that cleaning and oiling should go together. The actual interval recommended varied from six months to one year, with a leaning in favor of the latter. On the Chicago & Northwestern, where there are now 18,700 air-braked cars and where 14,000 have been in service for four years, an interval of one year has been adopted for oiling and cleaning, and very few cases of deterioration are reported on taking out pistons, and it rarely happens that a more frequent attention is required by any of the equipment.

It was shown that not only is the time interval between oilings an important matter, but the most careful attention must be paid to the method of doing the work and the kind of lubricant used. The use of grease found many advocates, but it was shown that some greases had been used that had hardened into a ball, and in one case as large as an egg had been found so hardened that it was impossible to tell what it was originally, but it had filled the leakage grooves. The cases of this kind that were reported seemed to indicate a lack of attention as much as anything else. The grease that was acknowledged to be the best for brake cylinders was that known as Kent's compound, and yet in one case where the cylinder was bolted to the firebox of a locomotive this gave out in one trip while another sort whose brand was not mentioned, ran well. But as a rule the results obtained with grease were satisfactory.

bridges and retaining walls have been the principal work done so far.

Under the head of "Street Railroads," the Commissioner discusses safety brakes, and thinks that the need of such a brake is more pressing than the need of fenders on cars.

The Commissioner recommends the passage of a law to make walking on the tracks a misdemeanor, and one requiring electric roads to equip every car with fenders and wheel guards. The principal statistics of the report may be summarized as follows:

Miles of railroad in state	479
Number of grade crossings of streets and railroads	239
Crossings guarded by gates	75
Crossings guarded by flagmen only	82
Passengers killed during the year	0
Passengers injured	1
Employees killed	5
Employees injured	49
Other persons killed	20
Other persons injured	22

Street Railroads:	
Number of street railroad corporations	8
Number of cars owned by same	636
Number of same warned by electrical apparatus	210
Miles of street railroad track	143
Horses	22
Motor or grip cars	404
Other cars	232
Capital stock	\$3,282,000
Funded debt	383,200
Floating debt	1,736,476
Receipts for the year	1,674,981
Expenditures	989,074
Net earnings	635,266
Passengers carried	32,618,473
Persons killed on street railroads	7
Persons injured on street railroads	27

The report contains the reports of the railroad companies in full, and the general railroad laws of the state.

Compound Switching Locomotive.

The accompanying engravings and specification illustrate and describe a six-wheel connected compound switching locomotive, designed by Mr. Wm. Buchanan, Superintendent of Motive Power and Rolling Stock of the New York Central, for use in making up passenger trains in the Grand Central Station, New York, and built by the Schenectady Locomotive Works.

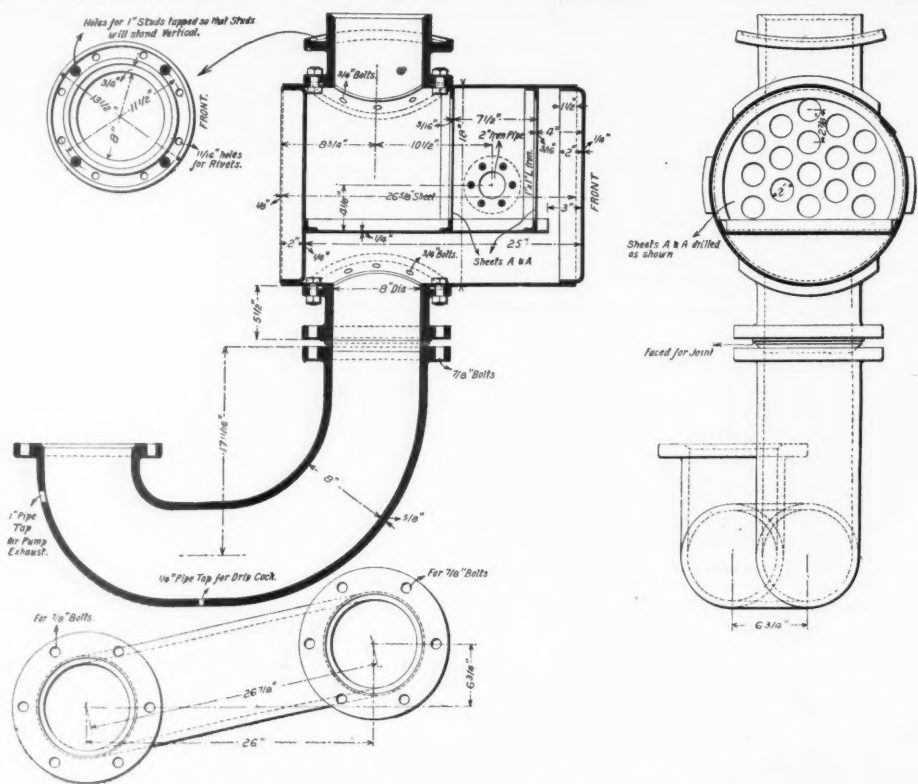
The end in view in designing this engine was to dispense with the objectionable sound of the exhaust. This is accomplished by use of the two cylinder compounding device, the exhaust reservoir in front of cylinders, and the annular variable exhaust in smokebox, so that the engine in the heaviest service is practically noiseless.

As stated, the engine is of the two-cylinder compound type, the high-pressure cylinder being 19 in. x 24 in., and the low-pressure cylinder 29 in. x 24 in. The intercepting valve is of the Schenectady Locomotive Works improved type. The exhaust of the low pressure cylinder passes through a large pipe to the reservoir in front of smokebox, and thence through into the variable exhaust in smokebox. The exhaust reservoir is provided with perforated plates through which the steam passes. The exhaust reservoir and the variable exhaust nozzle were designed by Mr. Buchanan. They are shown in the engravings. The exhaust from the air pump is also muffled by passing through the exhaust reservoir.

The engine steams very freely, is very quick in its action, and fills a long felt need of a noiseless switching locomotive for work in city yards.

DESCRIPTIVE SPECIFICATION OF A SIX-WHEEL COMPOUND SWITCHING LOCOMOTIVE.

General Dimensions.	
Gage	4 ft. 8 1/2 in.
Fuel	Anthracite coal
Weight in working order	125,000 lbs.
Weight on drivers	125,000 lbs.



Exhaust Box—Schenectady Switching Locomotive, for Grand Central Station.

Wheel base, driving	11 ft. 6 in.
" rigid	11 ft. 6 in.
" total	11 ft. 6 in.
Cylinders.	
Diam. of cylinders	29 in. R. H. 19 in. L. H.
Stroke of piston	24 in.
Horizontal thickness of piston	5 3/4 in. at hub; 4 3/4 in. at rim
Diam. of piston rod	3 3/4 in.

Kind of piston packing..... Plain rings of cast iron
rod packing..... United States Metallic
Size of steam ports..... L. P. R. H., 20 in. x 1 1/4 in.; H. P. L. H., 18 in. x 1 1/4 in.
Size of exhaust ports..... L. P. R. H., 20 in. x 3 in.; H. P. L. H., 18 in. x 3 in.
Size of bridges ports..... 1 1/4 in.

Valves.
Kind of slide valves..... Richardson balanced
Greatest travel of slide valves..... 5 1/2 in.
Outside lap "..... L. P. R. H., 3/4 in.; H. P. L. H., 1 1/4 in.
Inside clear "..... 1/2 in.; 3/4 in.
Lead of valves in full gear..... 1/8 in.
Kind of valve stem packing..... United States Metallic

Wheels, etc.
Diam. of driving wheels outside of tire..... 51 in.
Mat'l " centers..... Steeled cast iron
Tire held by..... Shrinkage
Driving box material..... Steeled cast iron
Diam. and length of driving journals..... 8 in. dia. x 9 in.
main crank pin journals..... 5 1/4 in. dia. x 5 in.
" " " side rod crank pin journals,
Main 5 1/4 in. x 5 in. F. & B. 4 1/2 in. dia. x 3 1/2 in.

Boiler.
Style..... Wagon top
Outside diam. of first ring..... 60 in.
Working pressure..... 180 lbs.
Mat'l of barrel and outside of firebox..... Carbon steel
Thickness of plates in barrel and outside of firebox.....
Horizontal seams..... Butt joints, sextuple riveted, with
weld strip inside and outside
Circumferential seams..... Double riveted
Fire box, length..... 107 1/2 in.
" width..... 42 in.
Firebox, depth..... Front 72 in., back 69 in.
material..... Carbon steel
plates, thickness..... sides, 1/2 in.; back, 3/4 in.; crown,
3/4 in.; tube sheet, 1/2 in.
" water space..... 4 in. front, 3 in. sides, 3 in. at bottom
tapering to 4 1/2 in. at top back.
" crown staying..... 5 in. x 3/4 in. crown bars, welded at ends
staybolts..... 1 in. dia. Burden staybolt iron
Tubes, material..... Mild steel No. 11 W. G.
" number of..... 271
" diam..... 2 in.
" length over tubesheets..... 11 ft. 0 in.

tem, which have been under discussion for several meetings; and, with certain slight changes of detail, these reports were adopted, and the codes will be at once added to the Standard Code of Train Rules.

The Car Service Committee recommended that the rules of the Association concerning the rates for passenger train equipment hired by one road from another be changed so as to include postal cars with passenger cars, though mail storage cars are left as they were, in the same class with baggage cars. As now approved the rate for postal cars will be 3 cents a mile, or \$5 a day; mail storage cars 1 1/2 cents a mile, or \$3 a day. The term "postal car" is intended to mean cars used exclusively for the mail service as railway post offices.

The address of the President was published in the *Railroad Gazette* last week.

On the announcement of the retirement of Colonel Haines, the President of the Association, the following resolution, offered by Mr. E. B. Thomas, was unanimously passed:

"WHEREAS the members of the American Railway Association learn with the most sincere regret of the retirement from railroad service of Col. H. S. Haines, for many years its honored President, and his consequent ineligibility for re-election under its rules, therefore be it

Resolved, That the thanks of this association are hereby tendered to Col. H. S. Haines for the dignified, able and impartial manner in which he has presided over its meetings and guided its councils.

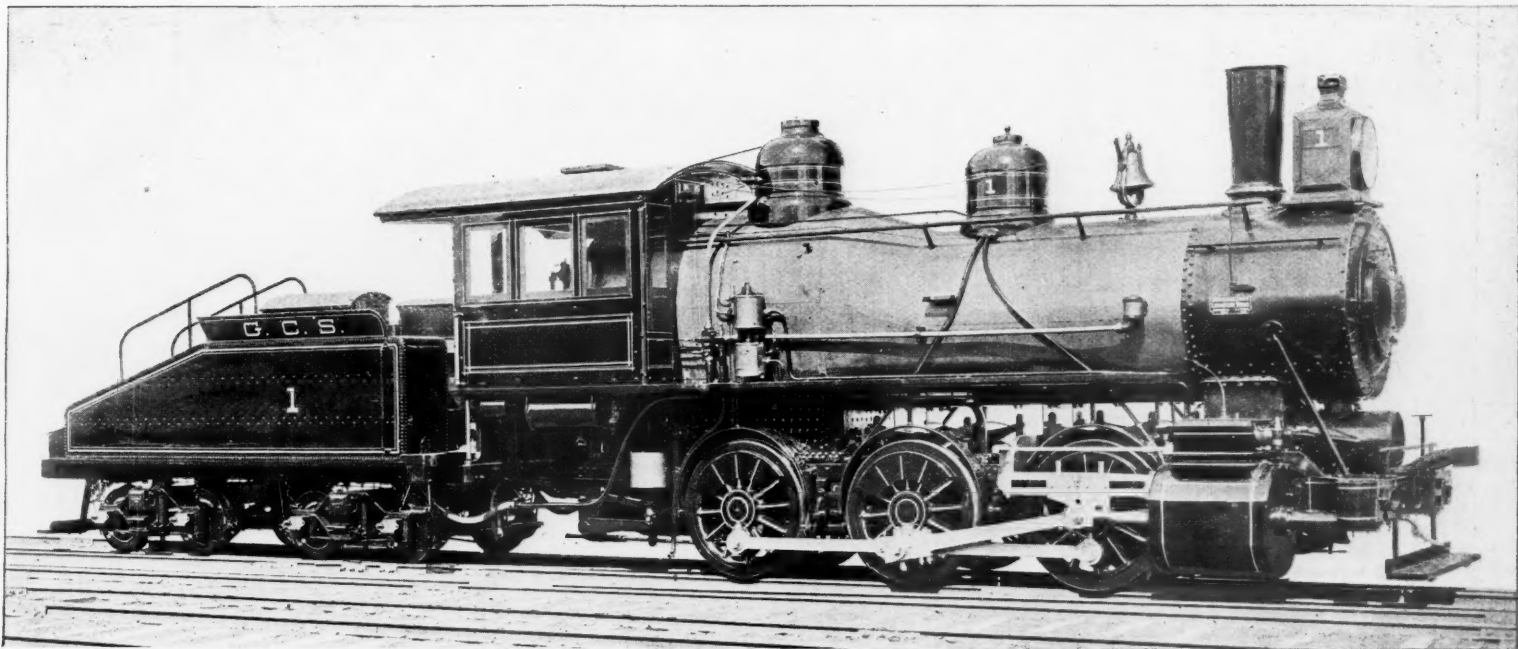
Further Resolved, That this association extends to Colonel Haines the assurance of the affectionate regard in which he is held by all of its members."

The election of officers for the ensuing year resulted as follows: President, E. T. D. Myers (Richmond, Fredericksburg & Potomac); First Vice-President, E. B. Thomas (Erie); Second Vice-President, Joseph Wood (Pennsylvania Company); Members of Executive Com-

made anywhere on the division. Grades marked "V. G." are variable, the changes being too small to be shown on the scale of the drawing.

We are also able to give herewith the official figures of the "log" of the entire run, the figures for the last part of the run being supplemented by the speed between stations, and our correspondent, who has calculated these out, states that they check very closely with the official figures for the average speed over the division. In regard to doubts which have been expressed as to the accuracy of the record, it is stated that the figures given by local papers of the towns through which the train passed tallied closely with the official figures of the train sheet, while the times of starting and finish recorded by reporters for the Chicago and Buffalo papers respectively form another check upon the actual running time. It has been assumed that the time was taken only in minutes, but this, we are told, is entirely erroneous, as shown below. There were four time-keepers, working two at a time, each holding a stop watch. The superintendent of each division called out the names of the stations as the train passed, and a fourth man took down the figures called off by the time-keepers. All the men are well known in railway and professional circles, and any talk of collusion or false figures would be absurd, while the official record was sent out over the signature of Mr. Canniff, the General Superintendent of the railway, who was in the train.

The engines used on the first four divisions of the run were of the eight-wheel type—illustrated in *The Engineer* of Nov. 15, 1895—having four driving wheels of 6 ft. diameter, and a four wheeled leading truck or bogie. On the last division, however, an engine of the ten-wheel type was used, having six driving wheels 5 ft. 6 in. diameter, and a four-wheeled leading truck. It had cylinders 17 in. x 24 in., ample boiler and firebox capacity. It weighed 113,500 lbs., with 88,500 lbs. on the driving wheels. One reason for using this engine was that it had a tender of greater tank capacity than the tenders of the other engines. The others carried 3,100 gals., and this one 3,700 gals. of water, and the tank was practically empty at the end of the run. Each tender carried six tons of coal. This tender weighed loaded 88,500 lbs., and the others 80,000 lbs. The maximum speed was



Compound Switching Locomotive for the Grand Central Station, New York.

Built by the SCHENECTADY LOCOMOTIVE WORKS, Schenectady, N. Y.

Mr. WILLIAM BUCHANAN, Supt. Motive Power and Machinery.

Heating surface, tubes..... 1,547.5 sq. ft.
firebox..... 192 sq. ft.
" total..... 1,739.5 sq. ft.
Grate..... 31.24 sq. ft.
" style..... Rocking, no drop plate
Ashpan, style..... Sectional, with dampers F. & B.
Exhaust pipes..... Single, muffled through exhaust box,
nozzles..... Variable 5 in. and 8 in. dia.
Smokestack, inside diameter..... 20 in. at top, 16 1/4 in. at bottom
top above rail..... 14 ft. 6 in.
Boiler supplied by..... Two No. 8 N. & Co. Monitor injectors

Tender.

Weight, empty..... 28,500 lbs.
Wheels, number of..... 8
" diameter..... 30 in.
Journals, diameter and length..... 3 1/4 in. dia. x 7 in.
Wheel base..... 14 ft. 4 1/2 in.
Tender frame, S. L. W. Standard,
6 1/2 in. x 4 in. x 3/4 in. angle iron
channel iron center bearing F. & B.
Tender trucks, S. L. W. Standard,
3 1/2 in. dia. wheels
Water capacity..... 3,000 U. S. gals.
Coal..... 3 1/2 tons
Total wheel base of engine and tender..... 39 ft. 5 1/2 in.
length..... 52 ft. 4 1/2 in.
Engine fitted with: Westinghouse-American combined
brakes on all drivers, tender and train; magnesia sectional
boiler covering; double riveted firebox ring; one 3-in. consolidated
muffled and one 3-in. Ashton blow-back safety valve;
central steel brakebeams.

Meeting of the American Railway Association.

The spring meeting of the American Railway Association was held at Cincinnati April 15. It was one of the largest meetings in the history of the association, about 140 persons being present. The next meeting is to be held in New York, and the rule concerning the date has been changed so that hereafter the meetings, both in April and in October, will be held on the first Wednesday after the fifth day of the month. The date selected for the next change of time-tables is May 17. Only one important report was presented, that of the Joint Committee on interlocking and block signaling. This committee reported a code of requisites for installation and a code of rules for the operation of the block sys-

tem, Wm. H. Baldwin, Jr. (Southern Railway), Rollin H. Wilbur (Lehigh Valley); Committee on Train Rules, the Illinois Central, the Atlantic Coast Line, the Chicago, Burlington & Quincy; Committee on General Regulations for Employees, the Boston & Maine, the New York, New Haven & Hartford, the New York Central & Hudson River.

The Lake Shore & Michigan Southern Fast Run.

The Engineer (London) has recently published certain particulars of the famous run made last October on the Lake Shore & Michigan Southern, which are of a certain interest now (for the run is still fresh in the minds of those who are interested in such matters) and which are well worth recording in our pages for future use. The profile, which we reproduce, has not been published before, so far as we know. The log of the run, carried out to seconds, and from station to station, is also more complete than anything that we have seen printed elsewhere. While commending the thoroughness of our contemporary, we call attention also to its candor. In a discussion of the information sent by its correspondent, *The Engineer* says: "All that we have written on the subject we hasten to withdraw."

It will be remembered that the train made the run of 510 miles from Chicago to Buffalo in 7 hours 50 minutes 20 seconds, excluding for regular stops and one flag stop, or at the average rate of 65.07 miles per hour for the entire distance. The train consisted of three cars, weighing in all about 130 gross or English tons behind the tender.

The fastest running was done on the last stage of the run, from Erie to Buffalo, 86 miles, and our American correspondent has obtained from Mr. Hardy, the Chief Engineer of the Lake Shore & Michigan Southern Railway, the profile of this division, which we reproduce herewith. On the base line are marked the distances, measured from Erie, and above are marked the stations and the distances between them. No stops were

one mile at the rate of 92.3 miles per hour, and the average speed was 72.91 miles per hour for the 86 miles. The revolutions were 469 and 371 per minute, and the piston speeds 1,878 ft. and 1,484 ft. per minute for the maximum and average speeds respectively. The coal consumption was 3,250 lbs., equivalent to 37.79 lbs. per mile, 2,784 lbs. per hour, and 100 lbs. per square foot of grate per hour. The water evaporated was 30,833 lbs.—3,700 gals.—or 9.48 lbs. of water per pound of coal.

The following is the complete "log" of the run, which was made on Oct. 24, 1895:

I.—Western Division.

Time (a. m.)				Time (a. m.)			
Miles.	h.	m.	s.	Miles.	h.	m.	s.
South Chicago.....	3	23	27	La Porte.....	5	4	16
Whiting.....	3	5	34	Rolling Prairie.....	7	0	22
Pine.....	6	2	41	New Carlisle.....	6	3	28
Millers.....	6	8	3	Terre Coupee.....	1	7	4
Dune Park.....	5	7	3	Warren.....	4	7	4
Chesterton.....	5	8	3	South Bend.....	6	9	4
Burdick.....	4	1	4	Mishawaka.....	4	0	4
Otis.....	3	6	4	Osceola.....	5	5	4
Lurham.....	3	6	4	Elkhrt.....	5	5	4

Total distance..... 87.4 miles.
Elapsed time..... 1 hour 25 min. 26 sec.
Average speed..... 61.38 miles per hour

II.—Air-line Division.

Time (a. m.)			Time (a. m.)								
Miles.	h.	m.	Miles.	h.	m.						
Elkhart (leave).....	4	57	01	Melbern.....	5	9	6	07	29		
Dunlap.....	5	0	5	04	33	Bryao.....	5	0	6	11	37
Goshen.....	5	5	5	09	05	Stryker.....	7	3	6	18	13
Millersburg.....	7	7	5	16	26	Archibald.....	6	0	6	24	19
Ligonier.....	7	0	5	22	43	Lettisville.....	4	0	6	28	11
Wawaka.....	5	5	5	27	32	Waneseon.....	4	5	6	32	34
Brimfield.....	4	4	5	31	29	Delta.....	7	7	6	39	13
Kendallville.....	7	0	5	38	06	Swanton.....	5	7	6	44	30
Corunna.....	6	0	5	45	12	Holland.....	9	4	6	53	09
Waterloo.....	6	7	5	50	40	Air-line Junction.....	7	1	6	59	27
Rutler.....	7	5	5	57	20	Toledo.....	2	6	7	01	39
Edgerton.....	6	9	6	03	05						

Total distance..... 133.4 miles
Elapsed time..... 2 hours 4 min. 35 sec.
Average speed..... 64.25 miles per hour.

III.—Toledo Division.

Miles.	Time (a. m.)	Miles.	Time (a. m.)
Toledo (leave).....	7 04 07	Sandusky.....	2 9 53 13
Milbury.....	8 0 7 13 58	Huron.....	8 9 01 54
Martin.....	4 7 18 21	Ceylon.....	4 0 8 16 10
Graytown.....	4 5 7 22 23	Cerrillos.....	7 5 8 12 52
Rocky Ridge.....	2 4 7 24 34	Burkehelm.....	3 2 8 15 55
Oak Harbour.....	3 5 7 27 44	North Amherst.....	4 4 8 20 13
La Carne.....	5 5 7 32 21	Klyria.....	6 4 8 26 34
Port Clinton (stop)		Shawville.....	4 5 8 30 59
by flag, 2 m. 58..	6 1 7 40 59	Olmeda Falls.....	6 2 8 34 25
Gypsum.....	3 0 7 44 05	Berea.....	2 1 8 39 19
Marblehead.....		Rockport.....	7 1 8 44 29
Junction.....	2 1 7 45 59	Cleveland.....	4 7 8 50 13
Venice.....	4 9 7 50 38		

Total distance..... 107.8 miles.
Elapsed time..... 1 hour 49 min. 6 sec.
Average speed, including stop..... 60.96 miles per hour.
Average speed, deducting stop..... 62.18 miles per hour.

IV.—Eastern Division (First Section).

Miles.	Time (a. m.)	Miles.	Time (a. m.)
Cleveland (leave).....	8 51 58	Ashtabula.....	4 8 9 42 13
Collinwood.....	7 5 9 01 26	Kingsville.....	5 7 9 47 29
Nottingham.....	2 0 9 03 17	Tower No. 2.....	3 0 9 49 51
Wickliffe.....	4 7 9 07 26	Conneaut.....	4 5 9 53 48
Willoughby.....	4 2 9 11 07	Springfield.....	7 5 9 59 58
Mentor.....	4 3 9 14 57	Girard Junction.....	3 5 10 02 47
Painesville.....	6 3 9 20 02	Girard.....	1 3 10 04 04
Perry.....	5 5 9 25 08	Fairview.....	4 5 10 07 54
Madison.....	5 3 9 29 28	Swanville.....	2 5 10 10 06
Unionville.....	2 2 9 31 19	Dock Junction.....	6 2 10 14 30
Geneva.....	3 2 9 33 44	Erie.....	2 3 10 17 30
Saybrook.....	4 5 9 37 20		

Total distance..... 95.51 miles.
Elapsed time..... 1 hour 25 min. 32 sec.
Average speed..... 67.01 miles per hour.

Summary.

	Distance, Miles.	Average running speed, Miles per hour.
Western Division.....	87.4	61.38
Air-line Division.....	133.4	61.25
Toledo Division.....	107.8	60.96
Eastern Division (first section).....	95.5	67.01
Eastern Division (second section).....	86.0	72.94
Total (Chicago to Buffalo).....	510.1	65.07

Brake Slack Adjusters.

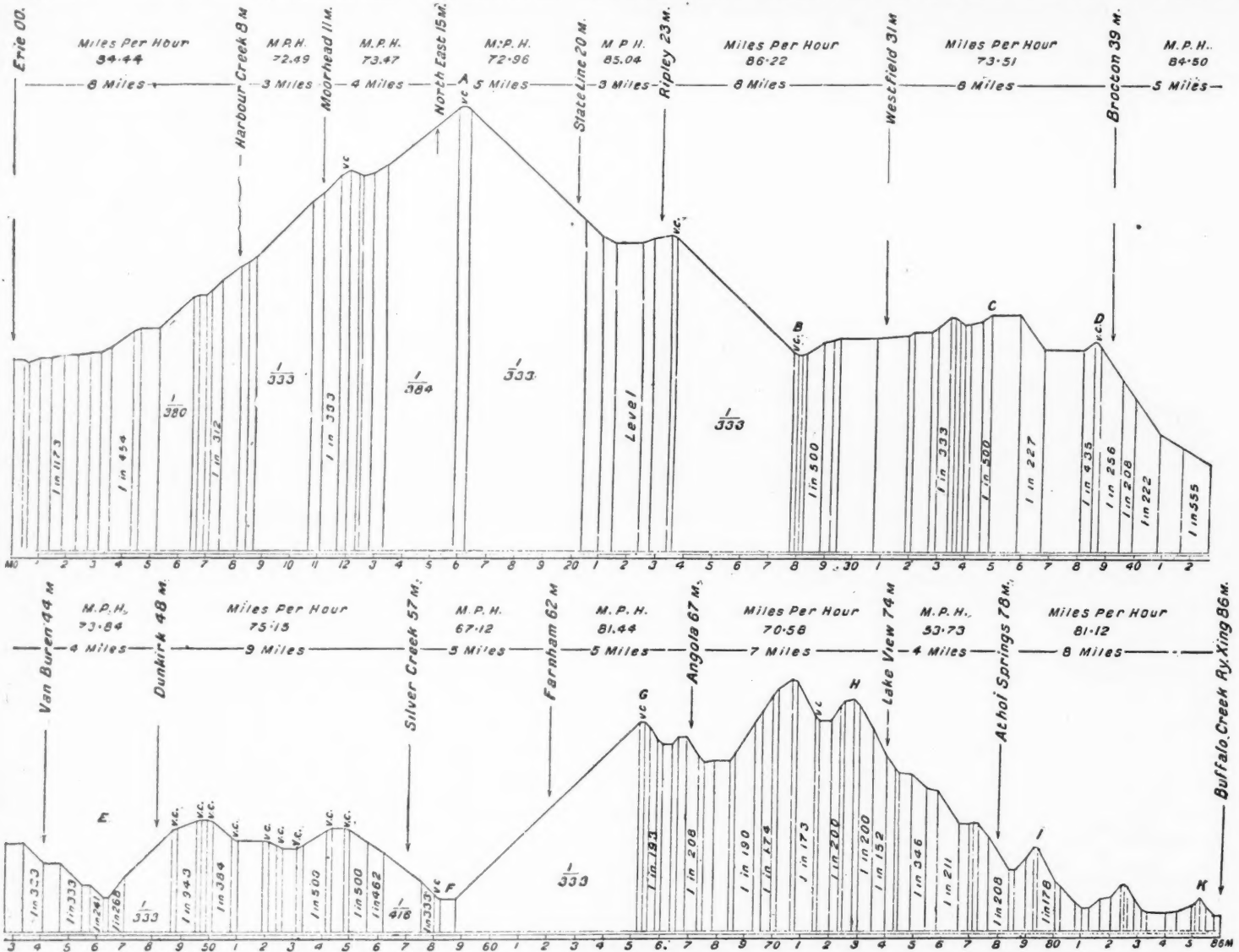
At the convention of the Air Brake Men's Association held in Boston last week a committee presented a report on slack adjusters. This committee consisted of Messrs. Blackall, Farmer, Corey, Sewall, Multhauer, Nellis and Lemcke. That report we give nearly in full in what follows:

In the last report of the Air Brake Association is to be seen the result of a test where there were three cars in a passenger train, only two of which were equipped with slack adjusters. In going 7,200 miles the cars with the adjusters wore 101 lbs. of metal from the brake shoes of each car, as against 71 lbs. from the shoes of the car not equipped. This test also shows the great importance of adjusters.

Every increase of one inch in piston travel means the loss of about 1½ lbs. pressure in the brake cylinder when the brakes are full set. On a 10-in. cylinder this means a loss of 118 lbs. on the push rod. With a total leverage of 9 we lose 236 lbs. on each breakbeam, or 1,064 lbs. on the car. When we think that the ordinary

on the tie rod, the McKee on the cylinder end of the cylinder lever, and the Hinkley on the bottom connection of the live and dead levers, and the dead lever test which covered the method of other adjusters. Those used would cover all that is necessary in regard to loss or gain due to the angularity of levers, and covered the ground as well as using a multitude of different adjusters, many of which would create the same effect as regards the angularity of levers.

There are certain requirements which must be met before we have the era of the successful adjuster, among them being the following, which are not based alone upon theory, but have also come to light through actual service. It must keep the piston travel within a certain fixed limit, and it would seem best to have the variation very small. It must take up slack to the desired amount, and also, if it can be done, let it out if occasion demands. There is bound to be more or less trouble if this requirement is not met, for as the age of a car increases it will of necessity gain a certain amount of free slack, such as is found in king bolts, boxes, spring in brake beams, etc., and this slack manifests itself more particularly when the brake sets, and all of these things tend to lengthen the piston travel abnormally, especially when the car is in motion. A car may run loaded for some time, and in the meantime have its piston travel adjusted, even if equipped with an adjuster taking up a very small amount of slack at one time. When the car becomes light the piston travel is shortened according to the height the body of the car is lifted above what it is when loaded, and according to the distance below the center of the wheel that the shoe is hung. If the adjuster is to be used on passenger cars, the idea of loaded and light cars does not become so prominent, as passenger cars are mostly loaded. We have seen a cut of but one device, the Universal Slack Adjuster, which claims to do both take up and let out slack. The location of an adjuster would best be as far away from dust and flying obstacles as possible, away from any drippings from steam heat, and be out of the



Profile of the Michigan Southern & Lake Shore Railway, from Erie to Buffalo.

V.—Eastern Division (Second Section).

Elapsed time.	Speed, Miles per hour.	Distance between Stations, Miles.	Time (a. m.)
Erie (leave).....			10 19 48
Harbour Creek.....	54.44	8	10 28 37
Moorhead.....	72.49	3	10 31 06
Northeast.....	73.47	4	10 34 22
State Line.....	72.96	5	10 38 15
Ripley.....	85.04	3	10 40 22
Westfield.....	85.22	8	10 45 56
Brocton.....	73.51	5	10 52 06
Van Buren.....	84.50	5	10 55 39
Dunkirk.....	73.84	4	10 58 54
Silver Creek.....	75.15	9	11 06 05
Fairhaven.....	67.12	5	11 10 33
Angola.....	81.44	5	11 14 14
Lake View.....	70.58	7	11 20 11
Athol Springs.....	53.73	4	11 24 39
Buffalo Creek.....	81.12	8	11 30 34
Total (no stops).....	72.91	86	

Total distance..... 86 miles.
Elapsed time..... 1 hour 10 min. 46 sec.
Average speed..... 72.91 miles per hour.

freight car is braked at 70 per cent. of its light weight, and that this becomes about 25 per cent. of the entire weight when loaded, we realize that we must have all there is back of us in holding a train down a heavy grade. At present the inspector changes the dead lever to give us this power, and it is no uncommon thing to see a train held from two to five minutes on freight trains while the inspector works to get a cotter out of the pin which holds the dead lever in its guide. . . . Although as yet none have been turned out to our knowledge that are perfect, still there are several adjusters on the market containing very admirable points. The questions before us are as to the possibilities and requirements of a practical adjuster.

The committee was unable to make road tests of all adjusters, and come to a decision as to which was the better, but the subject was taken up under two heads. One, the careful study of an adjuster, as to its parts, the character of its parts, what the adjuster should do and what it should not do; the other the effect upon the braking power from angularity caused by the adjuster being placed in different parts of the brake rigging.

There are at present some 70 or 80 adjusters registered in the Patent Office at Washington, and although the committee had comparatively few, they had a sufficient number which would take up the slack in the different places that would in all probability be considered as practical. The ones used—the Standard took-up slack

way in case it is necessary to remove wheels. It should also be placed so as not to produce too great angularity of levers.

It must be built up of parts that will stand the strain when the braking power is high. Practical tests should be made by companies before deciding on any adjuster. It must be composed of parts not likely to weaken or get out of order.

It must be remembered that shoes wear out and must be renewed by a car inspector, and the adjuster must be one easily understood, and that occasions as little work as possible in renewing shoes. An adjuster that takes care of itself after the first application of the brake takes away the chance of a mistake by a class of men who are not paid so much for what they know as for what they do, and, while there are many exceptions, the average car inspector can't cope with any complication. It should be of such parts as need no renewal except in case it is broken by collision, and should be one that permits of being easily applied or removed.

For freight use the adjuster must not depend upon the release of the brakes to work it, as in the freight equipment the cylinder spring forces only the piston to release position, and the return of the other parts to the desired position depends upon the jar of the wheels against the shoes and upon the angle of the brakebeam hangers. These hangers should be at such an angle as to allow the shoes to leave the wheels under the action of gravi-

tation, but we must remember that the friction of pins and rods must also be overcome to allow shoes to leave the wheels. Therefore it is best, in freight service at least, not to depend upon the return of the brakebeams and levers to full release position, as it is an uncertain dependence.

It is essential as a matter of expense to railroads to do the work on a car with one adjuster rather than one on each track of the car, as there is half the danger of disarrangement of parts and expense of maintenance with one than with two. The adjuster should be such that no braking power should be lost on account of energy lost in working an adjuster.

In setting most adjusters it should always be borne in mind that the travel of the piston is always greater when the car is in motion, and a corresponding allowance must be made.

An objection to an adjuster taking up a very small amount of slack at one time, as $\frac{1}{2}$ of an inch, is that when a car is adjusted light it will take some time to readjust it when loaded or in renewing shoes; when slack is run out the adjuster will have considerable work to do. On the other hand, if the adjuster takes it up in a bunch, free slack will be taken up quickly, and the piston travel become too short.

The tests made to determine the loss of braking power due to angularity of levers lasted over a week and consisted of about 250 tests. The readings were taken from a dynamometer placed upon one of the brakebeams, and the results showed a slight advantage in taking the slack up on the bottom connection of the live and dead levers, but the committee considered this advantage offset by the fact that adjusters placed in that part of the rigging were more likely to injury from ice and snow and flying obstacles, and the fact that they were in the way in removing wheels.

The following tests were made with each of the adjusters and with no adjuster: 10 to 1 leverage both in service and emergency with old shoes, new shoes, old and new shoes mixed.

The same tests were made with a 5 to 1 leverage. In each test several readings were taken, both of pressure

ville, and a consolidation of five companies was effected under the title of The Columbia & Maryland Railway Company. Among the capitalists in this company are, Thomas M. Lanahan, B. N. Baker, David Neobold, John Hubner, T. Edward Hambleton, R. S. Carswell and George Yakell, of Baltimore; S. F. Tyler, of Philadelphia, and John Ridout, of Washington. The organization of the Baltimore & Catonsville Construction Company followed to build the road and to take temporary charge of affairs during the period of track laying and equipping the line.

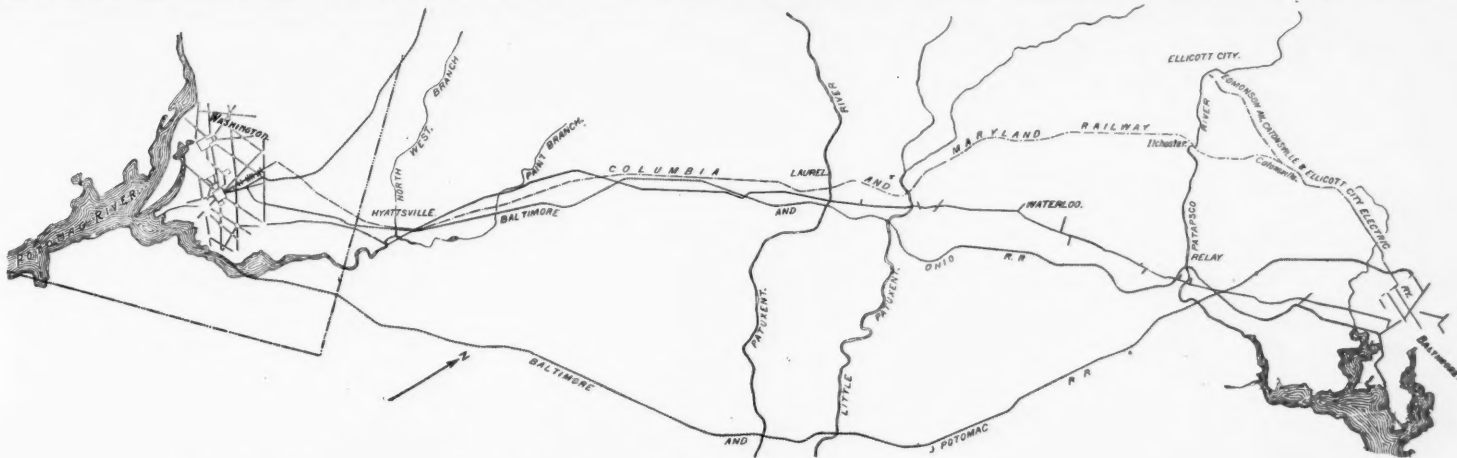
Starting from the crossing of Saratoga and Howard streets, in Baltimore, the route passes out of the city over Saratoga, Monroe and Franklin streets to the Calverton road. Following that turnpike into those of Edmondson avenue and the Rolling road respectively, it reaches Catonsville, whence the main line, when finished, will proceed across the Patapsco at Ilchester and thence to Laurel, Hyattsville and Washington, passing through the suburbs and into the city on Rhode Island avenue. At a point one mile beyond Catonsville a side line deflects westward, and, crossing private property, enters Ellicott City. This part of the line belongs to the Edmondson Avenue, Catonsville & Ellicott City Railroad, which was projected as an independent enterprise and incorporated in the Boulevard project at the time of the consolidation of interests last summer.

Since last June contracts have been let for grading, laying track, building bridges, constructing and equipping power houses, stringing wires, and for the cars. It was decided to build the line in sections, and work on the Washington end was commenced Aug. 20, 1895, by Contractor M. F. Taity. This section of the road extends

one generator in each power house shall be ready for operation by May 15. A booster system of voltage and transmission has been adopted for both power houses. Each of the power stations will contain 10 boilers of the Campbell-Zell pattern, of 300 H. P. each, and the engines are being built by McIntosh & Seymour, of Auburn, N. Y. The cars for this line, including the motor cars, are similar to those used on the Nantasket Beach line, and they are being built by the Barney & Smith Company, of Dayton, O. The motor car is a combination cab and baggage car, and trains will be composed of this and two coaches, each coach having a seating capacity for 48 persons.

Electrical experts are hoping to reach a minimum of 30 miles an hour, with a possible speed of 60 miles an hour. The road being comparatively straight and free from heavy grades, except near the Baltimore end, and 38 miles long between the two cities, something like an hour for the trip may be anticipated if present plans are realized. This will throw the electric line into direct competition with the steam railroads, with the possible effect of lower fares.

Although the Baltimore & Washington Electric Railroad is a short line, some serious engineering difficulties had to be overcome. Between the two cities it crosses the lines of steam railroads three times, but no grade crossings have been made. The tracks pass under the Baltimore & Potomac Railroad near Baltimore, and again under the Metropolitan Branch of the B. & O., near Washington. At Ilchester the electric line crosses the main stem of the B. & O., near the river, and a combination steel viaduct and bridge is in process of construction, 1,200 ft. long and 195 ft. high over the center



Sketch Map of the Baltimore & Washington Electric Railroad.

and lever angles, and the averages compared, the result before mentioned being obtained.

After the tests to find the effect of lever angularity upon braking power were completed, another test was made, which, although not bearing directly on the subject of slack adjusters, still it was deemed best to put in the report as an interesting and instructive point. The test consisted in getting a comparison between the power given by a retaining valve holding a 15-lb. pressure and that given by a man of ordinary strength. Mr. Lencke and a man of 160 lbs. weight each set the handbrake, and the average was taken as the braking power with a man of average strength at the wheel. It was found that a handbrake set by a man was equal to 27.5 lbs. in the brake cylinder or a retaining valve holding 15 lbs. was equivalent to just a fair handbrake.

This, of course, is simply a comparison, as there is a wide range of power developed by different men, a very light man often being able to set a brake tighter than a heavy man. We thus see that a retaining valve, giving less than a handbrake, is less likely to heat wheels if kept in use while charging in descending grades.

DISCUSSION.

The discussion of this paper was very brief. It was generally agreed that they should be used, and that if they were universally applied the total wear on brake shoes would be no more than it is at present, though in a mixed train of cars with and without this appliance those with the adjuster would probably show the greater wear. The angularity of the rods was stated to have no appreciable effect on the stresses.

Mr. Nellis thought the specifications of the committee for a suitable adjuster were too rigid, that there were several meritorious ones already on the market, and that the device had done more for foundation brake gears than almost anything else. If the adjuster is called upon to be of such a construction that nothing but a collision can injure it, more will be demanded of it than of any other portion of the car; and, if it must let out slack as well as take it up, a complication that is unnecessary will be added to the construction and no real benefit gained. What is wanted is a simple piece of mechanism that will keep the piston travel within proper bounds.

The Baltimore & Washington Electric Railroad.

Active operations on the electric railroad between Baltimore and Washington began in the summer of 1895. Prior to that time several enabling acts, franchises and special privileges had been secured from Congress, the Maryland Legislature and the City Council of Baltimore, so that everything was in readiness to acquire the right of way and to proceed with the work of construction. On June 19 a meeting of directors and officials in the various corporations which existed at that time for building this railroad, or parts of it, was held in Catons-

ville, and a consolidation of five companies was effected under the title of The Columbia & Maryland Railway Company. Among the capitalists in this company are, Thomas M. Lanahan, B. N. Baker, David Neobold, John Hubner, T. Edward Hambleton, R. S. Carswell and George Yakell, of Baltimore; S. F. Tyler, of Philadelphia, and John Ridout, of Washington. The organization of the Baltimore & Catonsville Construction Company followed to build the road and to take temporary charge of affairs during the period of track laying and equipping the line.

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Since last June contracts have been let for grading, laying track, building bridges, constructing and equipping power houses, stringing wires, and for the cars. It was decided to build the line in sections, and work on the Washington end was commenced Aug. 20, 1895, by Contractor M. F. Taity. This section of the road extends from the terminus on Rhode Island avenue, in Washington, to Laurel, a distance of 14 miles. The work has been pushed through the winter months, the grading and masonry are finished, and track laying is now well advanced. It is expected that the power house near Hyattsville and the electrical equipment of the line will be completed soon, so that this part of the road may go into operation and accommodate summer travel between Washington and the suburbs this year.

The construction of the Baltimore end of the line was entrusted to E. D. Smith & Son, of Philadelphia, and sub-contractors have been at work on the grading and masonry all winter. This portion of the railroad consists of a line between Baltimore and Catonsville, running thence across the Patapsco River to Ellicott City as above described. Operations are being pushed now to finish the line to Ellicott City, the roadbed having been finished and the tracks having been laid five miles out of Baltimore. The foundations of the power house at Ilchester have been laid, and the structure is nearing completion. It is stated in the offices of the company in Baltimore that cars will be running on this section as early as July.

Both sections will be double-track throughout of 95-lb. girder rails, within the city limits of Baltimore and Washington, and 85-lb. T-rails over the rest of the route. The road is stone ballasted, and the tracks are laid on hardwood ties, arrangements having been made for heavy cars and high speed. The plans of the Columbia & Maryland Railway Company contemplate the completion and operating of these two sections while the third is under construction. The roadbed from the Rolling road junction to Ilchester has been graded, and the contractor is at work on the viaduct over the tracks of the Baltimore & Ohio Railroad and the Patapsco River. It is proposed to complete the third section during the summer and autumn of 1896, having the equipment completed at the opening of the season in 1897.

The finances of the Columbia & Maryland Railway Company are declared to be in a sound condition, notwithstanding the application for receivership recently filed by the Philadelphia contractors. The committee has an authorized capital stock of \$5,000,000 and a bond issue of \$6,000,000 was voted at the Catonsville meeting last June. Work is still in progress at both ends of the line, and it may be assumed that the track laying and electric work will proceed without interruption to final completion.

Contracts have been let to the Westinghouse Electrical Company in Pittsburgh for the equipment of the two power houses. Each will contain eight 700 kilowatt generators. The contract specifies that at least

of the gorge. In approaching Ellicott City it became necessary to cut through a granite hill some 300 ft., the cut at the summit being 50 ft. deep. The stone taken from this cut will build the Ilchester power house, and furnish a considerable part of the ballast for the whole line. In rounding a curve as the road runs into Ellicott City it was found necessary to deflect a small stream, known as Cooper's Branch. The roadbed lies 15 ft. below the former bed of the stream, a new channel having been cut around an adjoining hill, and the possibility of overflow avoided by constructing dams along one side of the road. This has made the work of grading somewhat expensive, but when completed the line will have a direct and nearly level approach into Ellicott City.

Legislation in Iowa.

The legislature of Iowa, which has lately adjourned passed no important laws affecting railroad companies specifically, but in looking over the list in the *Sioux City Times* we find the following, which are of more or less interest:

One taxing express companies doing business in the State \$1 on each \$100 of gross receipts.

Requiring railroad companies to name their stations in conformity with the towns in which they are located.

Declaring express companies in Iowa common carriers and putting them under the control of the Railroad Commissioners.

Allowing railroads to give the Quartermaster General reduced rates when traveling with enlisted men under orders of Commander-in-Chief.

Providing that when any suit is brought against a telegraph company for damages caused by erroneous transmission of a telegram or any unreasonable delay in delivery of a telegram, negligence on the part of the telegraph company shall be presumed upon proof of erroneous transmission or of unreasonable delay and the burden of proof is to be upon the telegraph company to prove to the contrary.

The Gold Car Heating Company.

The annual meeting of the stockholders of the Gold Car Heating Company was held on Tuesday, April 14. Mr. Edward E. Gold was elected President, Mr. William E. Banks, Treasurer, and Mr. C. W. Osborne, Secretary. The report of the President, Mr. Gold, showed a large increase of business during the past year. Considerable new business has been obtained by this company and the foreign trade has grown considerably. A quarterly dividend of five per cent. was declared.



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EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

Last week we noticed the fact that the House bill for the introduction of the metric system had been sent back to the Committee and that the chance for its passage in this session of Congress is now rather poor; and yet we are inclined to think that if a modified bill were reported it would be passed and would be a decided step toward the introduction of the metric system in this country. The bill as presented made the metric system compulsory after Jan. 1, 1901. It was probably this provision which stopped progress for a time. It may be safely assumed that the metric system will be adopted in the United States sooner or later. This is the lesson of the progress of the world. Even in most conservative England, the agitation for the introduction of the metric system is very widespread and is decidedly important. There it is not confined to scientific men, but is being carried on very actively by traders and manufacturers, small and large. Apparently, the United States will be the last of the great civilized nations to adopt the metric system, but there can be no reasonable doubt that it will come in time. If we grant this, then the sooner we recognize that it is coming and begin seriously to prepare for the change, the better. If the change would be costly now, it would be far more costly ten years from now. It has seemed to us that the necessary legislation could be got very easily if the American Metrological Society would take into consultation half a dozen or more of the great houses manufacturing machinery. The Society and these manufacturers could arrange a law which would be a judicious compromise of interests, and which would be workable, and which probably would not be objected to by any serious part of the community when it was known that it had the approval of the great manufacturers; for, after all, they are the people on whom the burden of the change will fall most heavily. The idea of having the change begin with the first year of the next century is well enough, but it is not very important. That year has no practical meaning more than any other year. The point is, to begin definitely and intelligently to prepare for a change which is sure to come, and to bring the cost of the change down as low as possible.

From the Treasury reports just issued one may learn some interesting facts about the imports and exports of railroad material. We find that in the year ending June 30, 1895, our builders exported 252 locomotives, the value being \$2,379,519, and the average value \$9,442. In 1894 the exports of locomotives amounted to 142 machines of the value of \$1,028,336, or of an average value of \$7,242. Of the locomotives exported in 1895 much the greatest number went to Brazil, namely, 138, the value of which is given as \$1,648,758. The next largest customer was Cuba, which island purchased 36 locomotives to the value of \$240,633. To Japan 23 locomotives were sent, to the value of \$157,434. Chili purchased 8 locomotives valued at \$46,562. Of steel rails we exported in 1895 10,089 tons

valued at \$266,773. The year before we exported 15,561 tons valued at \$447,925. Of these rails much the largest part went to Cuba, namely, 4,633 tons, valued at \$121,662. To the Hawaiian Islands we sent 1,639 tons valued at \$51,239. To Mexico we sent 939 tons valued at \$27,495. No other country took anywhere near \$20,000 worth of our steel rails. In the same year there were exported 2,103 tons of iron rails valued at \$43,096. Of these, 1,141 tons went to Italy, 396 tons to Mexico and 213 tons to Santo Domingo. We exported stationary engines to the value of \$220,375 in 1895 and boilers and parts of engines to the value of \$376,325. The value of these two items in the former year was nearly twice as great. Our export of sewing machines in 1895 was about the same as that of locomotives, namely \$2,260,000. The export of saws and tools amounted to \$1,185,000, and of locks, hinges and other builders' hardware \$2,483,666. We exported wire to the value of \$1,277,000. No other single item of export of iron and steel (manufactured) amounted to as much as \$1,000,000, but the exports of machinery not mentioned by name amounted in 1895 to \$11,493,000, and the year before to \$11,438,000. The total value of exports of manufactures of iron and steel was \$32,000,000 in 1895 and \$29,500,000 in 1894. Our imports of rails "of iron or steel, or in part of steel," aggregated only 784 tons of the value of \$11,237. Of this amount 505 tons was imported from British Columbia through Puget Sound. Eighty-four tons were imported into San Francisco, 84 tons into Montana and Idaho, and 107 tons into the port of New York. The whole importation of this item, it will be seen, is a mere bagatelle.

The Hungarian Cabinet has been meddling with the free-pass business and has decided that it must be subject to "uniform" regulations on the state railroads. And these uniform regulations shut off nearly everyone except railroad and similar officials traveling on duty. The free passes heretofore issued to people belonging to these classes are to be called in and not renewed. State officers, members of Congress, journalists, contractors and furnishers of supplies who have heretofore had passes are coolly informed that they can have yearly tickets at the rate of \$75 for first-class, and \$60 for second-class passage. It makes one's blood boil to think of it! How long would a state railroad administration last here which made members of the legislature, aldermen, newspaper men and others of the aristocracy pay for riding? We fear that Hungary is trodden down under the iron heel of the oppressor.

The Zone Tariff in Hungary.

The Hungarian Zone tariff has been itself reformed, and, it is said, after this year is likely to be still further changed in its most peculiar feature. The changes already made, in effect since February, affect chiefly the local tickets, which were on a different basis from the zone tariff proper, the rates being fixed for the journeys from one station to the second or third station, without regard to the distance between these stations. The new arrangement substitutes three local zones, for these local rates; stations within 10 kilometers are in the first local zone, and fares to them are 10, 15 and 30 kreutzers (half as many cents) for the third, second and first classes; the second zone includes stations more than 10 kilometer distant, up to 15 (9.3 miles), with rates 15, 22 and 40 kreutzers, so that from New York to Newark you would pay 20 cents, first-class. The third local zone includes all stations from 15 to 20 kilometers (9.3 to 12½ miles) distant, to which the new fares are 20, 30 and 50 kreutzers. The rates of the first two zones are the same as the old local rates to the second and the third station, and there will be a change only when the distances between stations are greater than those given above, as they will be, doubtless, in most cases. All journeys of more than 20 kilometers will be included in the first zone of the general tariff, however few or many the stations within the distance. In 1894 nearly 19,000,000 trips were made by the local traffic, yielding \$1,248,000; by the new tariff the same trips would yield \$1,622,000, or about 30 per cent more.

The other part of the reform concerns chiefly first-class travel. Heretofore, on ordinary trains the second-class fare was 60 per cent, and the first-class 100 per cent, more than the third-class; on fast trains, the second-class paid two-thirds more and the first-class double, the third-class itself paying one-fifth more than on ordinary trains. Now the first-class rate is raised one-fifth on ordinary trains and one-fourth on fast trains. There are also some changes in first and second-class fares in the 13th and 14th zones—the latter including all distances exceeding 140 miles, including some journeys of as much as 625 miles. A correspondent of the *Journal* of the

German Railroad Union says that this 14th zone is sure to be cut up into several zones in time, and probably would have been now but for the great Hungarian Millennial Exhibition to be held this year. From the changes altogether a considerable increase in earnings is expected.

The changes made and to be made make the Hungarian tariff approximate in plan that of most other countries, with a larger unit of distance. It would be an error to conclude that the change made by the late Minister Baross (the original zone tariff) has proved a failure. It was without any doubt a great improvement on the old tariff, which was so high that it prohibited much travel in a population of peasants, and it has greatly developed travel in Hungary. That it was imperfect is easy to believe; all such schemes are, and they can be tested only by experience. The virtue of the Hungarian tariff, however, was in its reductions, and not in its "zones."

An advance is to be made also in Hungarian freight rates.

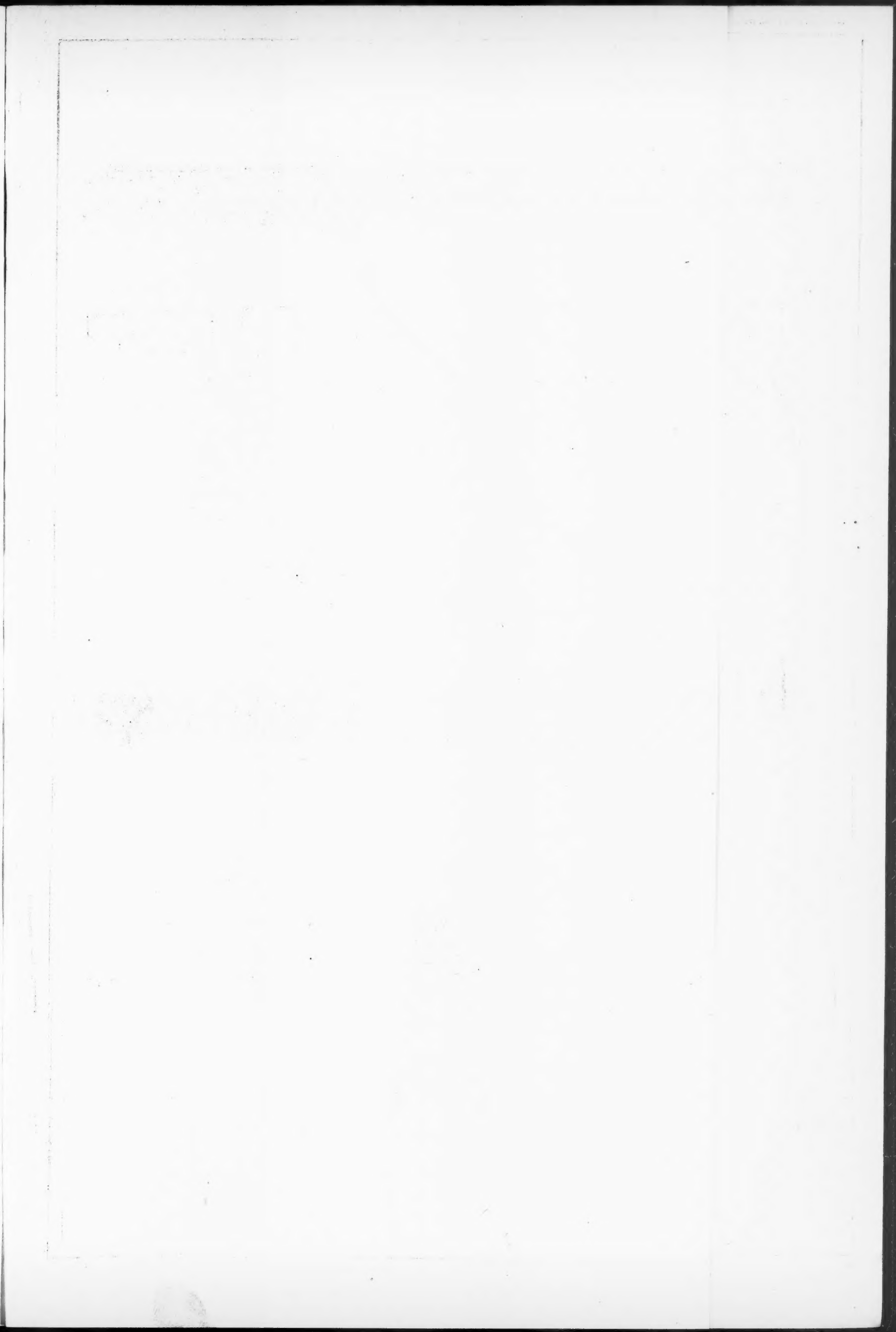
A Free Cartage Decision.

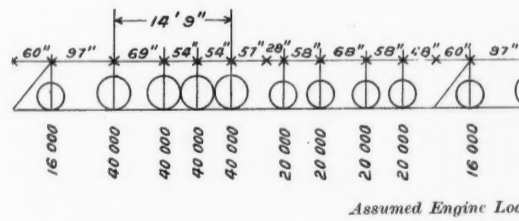
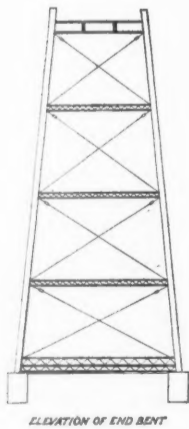
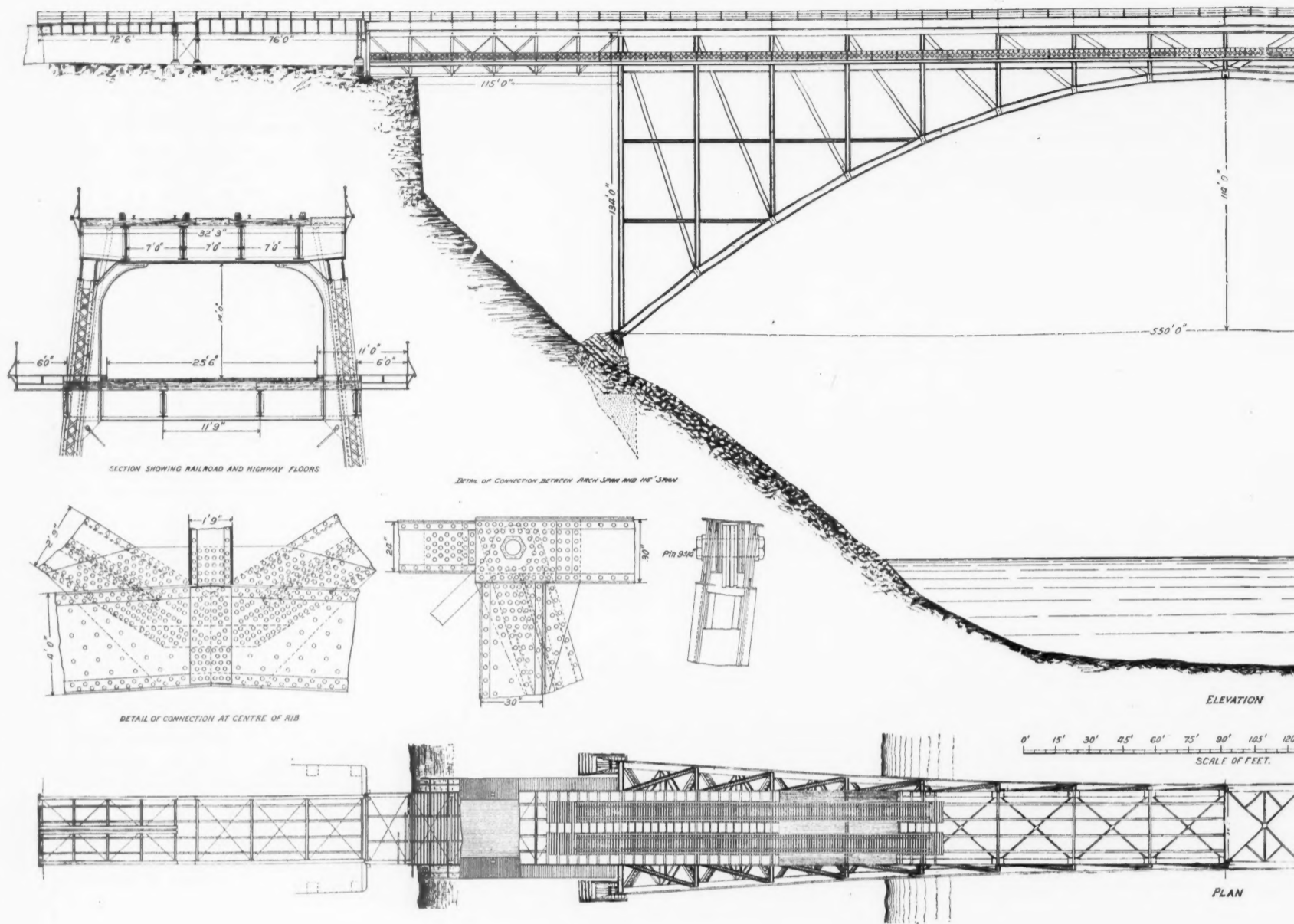
The free cartage controversy, which began at Grand Rapids, Mich., in 1888, has just been made the subject of a decision by the United States Circuit Court of Appeals, at Cincinnati, and the order of the Interstate Commerce Commission prohibiting free cartage at Grand Rapids is declared unlawful. The original complaint was by Mary O. Stone and Thomas Carten, of Ionia, against the Detroit, Grand Haven & Milwaukee. The first-class rate on freight from New York to Ionia was 75 cents, and to Grand Rapids, 37 miles farther, it was the same; but at the latter place the road delivered the goods in wagons to consignees without additional charge, the station being 1½ miles from the business center. Other roads, with freight houses nearer the business part of the city, looked upon this as unjust competition and procured the presentation of the Ionia complaint, which was based upon the violation of the long-and-short haul rule of the Interstate Commerce law. The decision now rendered, which was prepared by Judge Hammond, says:

The Interstate Commerce Commission, upon investigation of the facts, ordered that the free cartage at Grand Rapids be stopped. The railroad company refused to obey the order and the Commission filed a bill in the Circuit Court to compel obedience. The Circuit Court affirmed the order of the Interstate Commerce Commission, but modified it so that the company had the option to either establish like, or afford its equivalent in reduced rates of freight facilities at Ionia. This order of the Commission and the decree of the Circuit Court were based upon the ruling that it was a violation of the long-and-short haul prohibition of the fourth section of the act. . . . The service was an independent accessorial service which is under the control of the Interstate Commerce act whenever it is resorted to as a device to evade any of the provisions of the act, but from the facts in this case no such evasion is shown and the circumstances and conditions are so dissimilar that this mode of collecting and delivering the goods by the railroad company is justified. There are two lines of rival railroads having their station houses immediately adjacent to the business center at Grand Rapids, while it would cost the respondent company a very large sum of money to extend its lines into the city of Grand Rapids and locate its station house as favorably as that of its rivals, and it is open to the railroad company to adopt the cheaper mode of collecting and delivering by cartage if it chooses to do so. There is nothing in the act to compel the railroad company to establish a like accessorial service at the town of Ionia which is so much more favorably situated in the location of its station house.

It is also ruled that the order of the Interstate Commerce Commission must be passed upon as it was made and that there is no power in the Circuit Court to change or modify that order in a proceeding like this. If the order is lawful the court will compel obedience to it. If the order is not lawful it will neither compel obedience nor undertake to make a proper order and compel compliance with that.

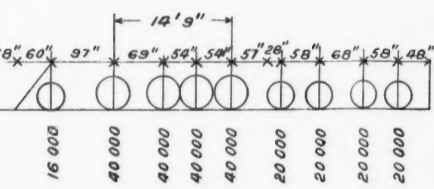
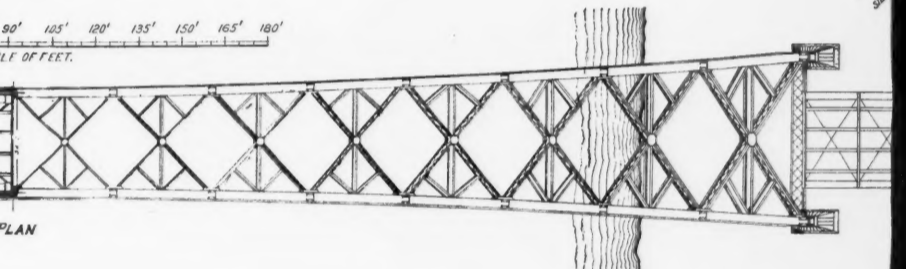
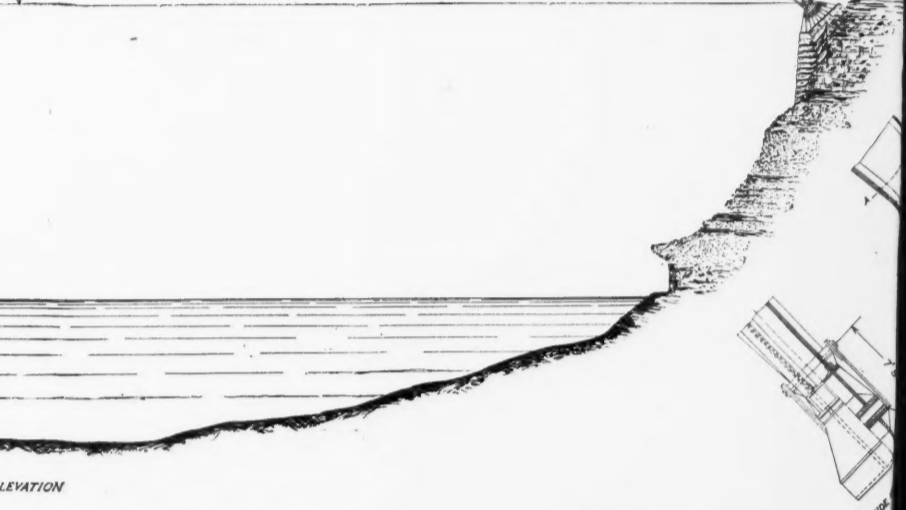
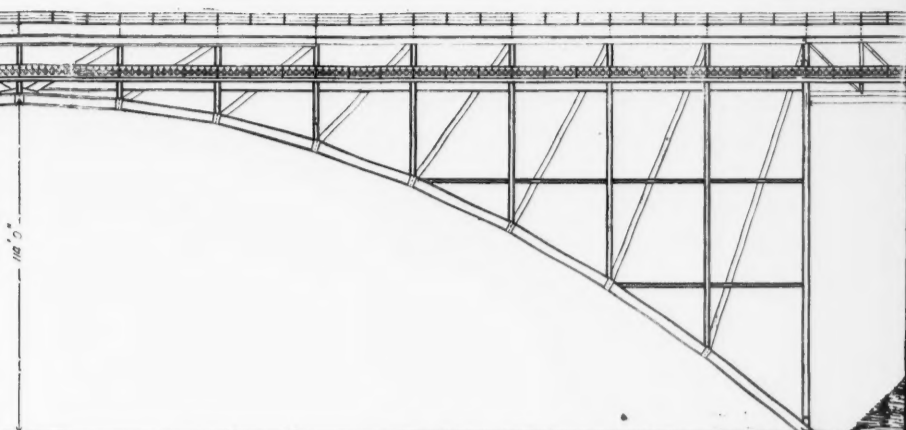
The foregoing synopsis is taken from a Cincinnati paper. If it correctly gives the substance of the decision it is to be hoped that the case will be carried to the Supreme Court of the United States, for the statement about the dissimilarity of circumstances, and the assertion that the character of the discrimination is to be judged according to whether there was or was not a purpose to evade the law, make a very inadequate answer to the strong arguments set forth by the Interstate Commerce Commission in justification of its prohibition of the free cartage. The Commission's order, written by Judge Cooley, April 26, 1890, says: "Where a common carrier subject to the Act to Regulate Commerce has established and published its schedule of rates and charges for a station on its line, free cartage furnished by the carrier for the collection and delivery of freight carried on its road to or from such station operates as a reduction or rebate from the schedule charge, and is unlawful. If free cartage at a station has the effect to reduce a rate below the charge at another station nearer the point of shipment it is unlawful as a less charge for a longer distance over the same line and in the same direction, the less being included within the greater. It is not material to the question of the lawfulness of free cartage furnished at one town and not at another that the





STEEL ARCH BRIDGE FOR DOUBLE TRACK RAILROAD, CARRIAGE WAY AND
BRIDGE BELOW NIAGARA

Mr. L. L. BUCK, M. AM. SOC. C. E.,

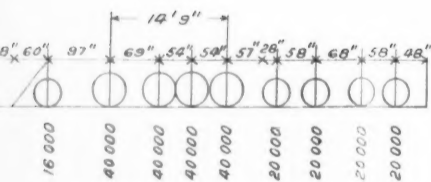
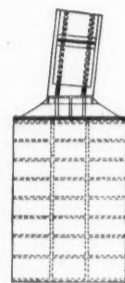
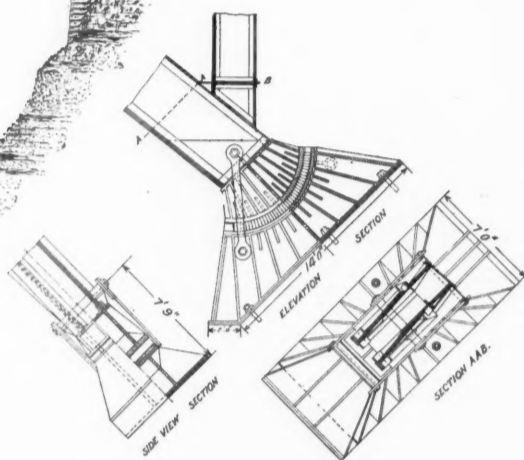
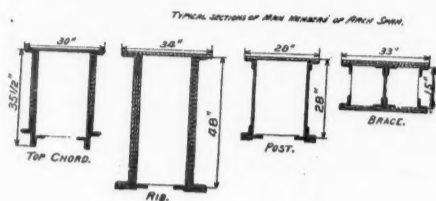
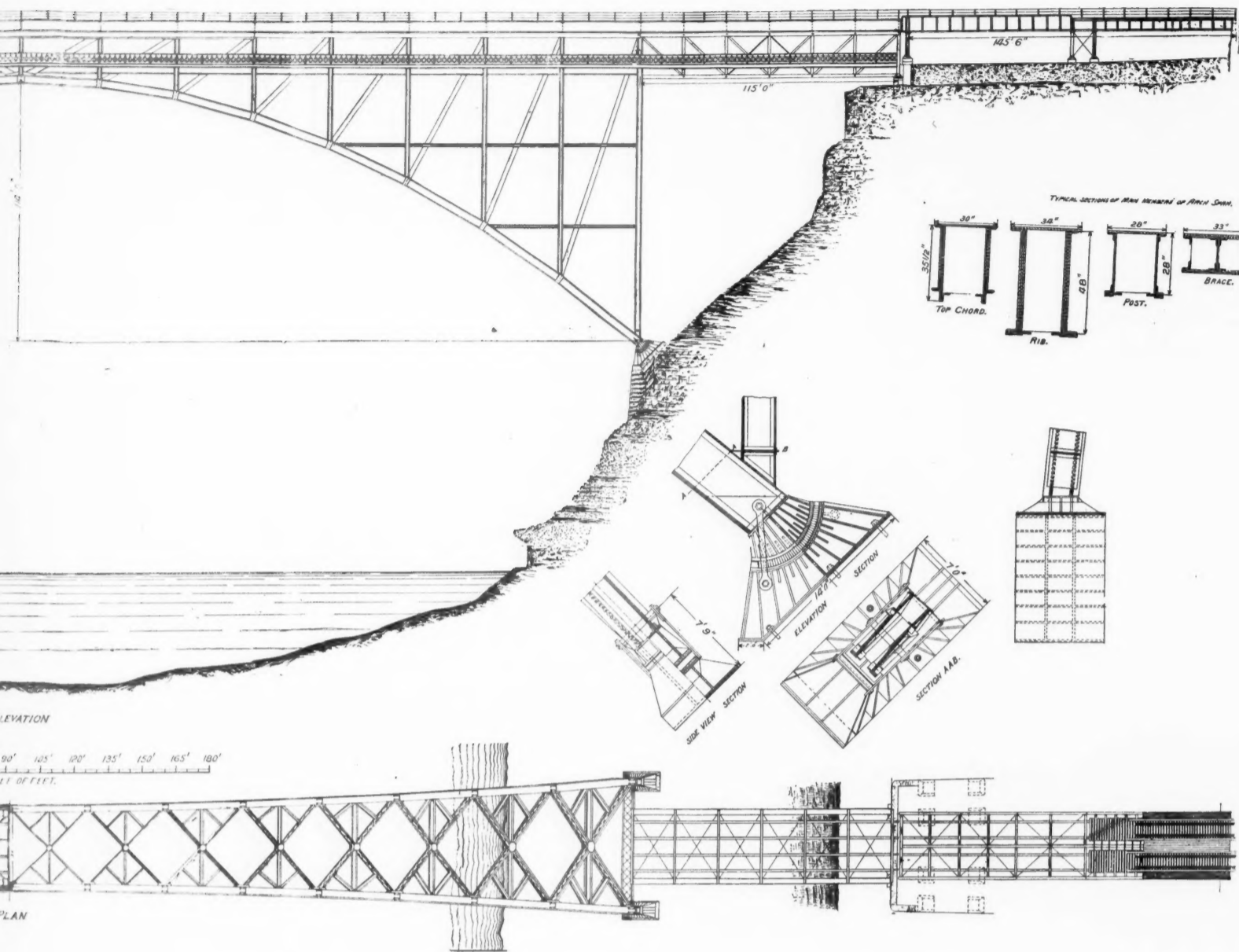


Engine Loading.

WAY AND ELECTRIC ROAD—TO REPLACE THE SUSPENSION RAILROAD
V NIAGARA FALLS

SOC. C. E., Chief Engineer.

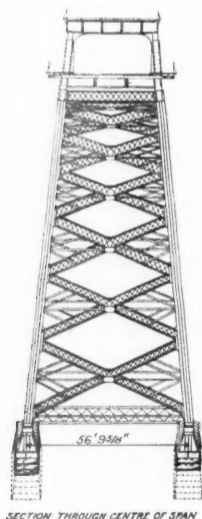




Engine Loading.

WAY AND ELECTRIC ROAD—TO REPLACE THE SUSPENSION RAILROAD
NIAGARA FALLS

SOC. C. E., Chief Engineer.



SECTION THROUGH CENTRE OF SPAN

business was done in that way for many years before the act to regulate commerce was enacted. If what was done and is now done works unjust discrimination or is in any particular obnoxious to the law, it is an abuse, and one that it must be assumed was intended to be corrected by the act."

Commissioners Morrison and Schoonmaker, in concurring with Chairman Cooley, added that the free cartage was in effect a rebate and an evasion of the law, regardless of its relation to the price charged to Ionia or any other place. The strength of Chairman Cooley's reasoning lies in his statement that it is the rule for a road's service to end at the freight house. If free cartage is allowed the question of the maximum and minimum distances within which it may be performed will always make trouble. Commissioner Bragg wrote a dissenting opinion, embodying the arguments of some of the lawyers that a wagon was similar to a freight house as a "facility," but he did not succeed in weakening the main point, that a railroad which builds its line outside of a town has no right to pretend that its track runs into the town. Rates are made from station to station, and no just and intelligent estimate of the fairness of a rate, in comparison with others, can be made unless the term "station" is understood to mean some definite point. The unreasonableness of the argument in favor of allowing free cartage is obvious when we consider the matter of publication of all tariffs which publication the law requires. The tariff showed the rate to Ionia, with no mention of cartage; and to Grand Rapids the same, with similar silence as to cartage; and as set forth by Commissioners Schoonmaker and Morrison the cartage allowance was an illegal rebate, regardless of Ionia's claim.

It is fortunate that the traffic managers of this country, or most of them, fully realize the demoralizing tendency of such a custom as carting freight free, and keep their faces firmly set against it. At Detroit, where it has long been in vogue, the movement lately agreed to, to curtail the wagon facilities or to do away with them altogether, seems to be progressing toward a favorable outcome. At New Orleans the question was a few weeks ago referred to arbitration. Competition in freight rates affects so many people, is subject to such general and active discussion whenever a change in tariff is made or proposed, and is so hard to manage with even an approximation to the differing views of various interested parties as to what is just, that every possible limitation of the problem should be set and clearly defined. By long established custom, with exceptions (like that at Grand Rapids) exceedingly rare, one of the limitations of the rate problem in this country is that rates shall be to and from definite locations (freight houses) in each town. This limitation is a valuable element, tending to keep the business free from confusion, which is not to be lightly thrown away. Causes producing confusion multiply fast enough, Heaven knows, without dragging in horses and wagons to aggravate our troubles.

In England free cartage is the rule, and it is so well entrenched that no one would think of trying to abolish the custom; but it adds a serious complication to the work of the operating department of the railroads, and, if we may judge from the complaints of excessive terminal charges and discrimination in such charges made by shippers, before the Government Commission since the revision of the tariffs, four years ago, it is the source of no little perplexity to the commercial department also. The charge has to be varied where the road does unloading or loading usually done by the owner, and likewise when the owner wishes to do some service that ordinarily the carrier performs and charges for. In view of the well-settled custom now prevailing in America it will doubtless be a good thing for the railroads if the Supreme Court shall approve not only the Interstate Commerce Commission's order, but also the reasons for granting it, including those set forth by Messrs. Morrison and Schoonmaker. Such a decision would probably forever protect the railroads of this country from the complications and perplexities in this specific matter under which the railroads of England now labor, for it would practically settle the law that a railroad shall not carry freight except in cars and on its own right of way (or the track of a connecting railroad), unless a clear public need for such outside service is affirmatively shown. The Interstate Commerce Commission, or any other impartial tribunal, would very rarely find occasion to recommend the suspension of such a law.

Annual Report's.

Pittsburgh, Cincinnati, Chicago & St. Louis.—The annual report of this railroad for the year ending Dec. 31 was made public last week. The main results of operation are given as follows:

	1895.	1894.	Inc. or dec. per ct.
Miles worked.....	1,151	1,151	
Earnings:			
Freight.....	\$10,645,368	\$9,741,142	I. 9.3
Passengers.....	3,499,610	3,357,628	I. 4.2
Express.....	421,636	330,097	
Mails.....	690,131	650,406	
Rent of railroad.....	44,877	39,995	
Other rent.....	8,884	21,466	
Miscellaneous.....	159,170	97,162	
Total.....	\$15,439,707	\$14,247,856	I. 8.4
Expenses:			
Maintenance of way and structures.....	\$1,703,386	\$1,310,681	I. 27.
Maintenance of equipment.....	2,316,875	2,052,024	I. 11.
Transportation.....	6,267,108	6,471,945	D. 3.
General.....	273, 61	267,249	
Taxes.....	658,014	633,620	
Total.....	\$11,248,545	\$10,765,500	I. 4.5
Net earnings.....	4,191,161	3,482,356	I. 20.4
Ratio of expenses to earnings.....	72.85	75.56	

The total net revenue for 1895 was \$4,234,827; for 1894 \$3,498,359. From the net revenue for 1895 is deducted \$2,678,427 for interest and rentals, leaving the net profit of the year \$1,556,401. This is an increase of \$624,000 over the net profit for 1894. The surplus on all lines operated in 1895 was \$1,022,897, an increase of \$387,406 over 1894. Dividends were paid to the amount of \$452,716, and the balance to profit and loss is \$714,194, against \$428,538 the year before. No dividends were paid after April, 1894, until January of this year, when 2 per cent. was paid on the preferred stock. It will be seen that the gains were substantial.

The tons transported were 11,648,000, against 10,381,000 the year before. The ton mileage increased 10 1/2 per cent. The increase was largely in through traffic, the largest items of increase having been general merchandise, livestock, coal, ore, coke, iron and the like. The largest items of decrease were in grain, flour, cotton, dressed meats and sugar. The average freight rate was 0.65 cent., the same as in 1894, but the cost of movement was decreased 0.004 cent.

The passengers carried were 5,881,636, an increase of 254,000 over the preceding year, mostly in local travel. The passenger mileage increased a little more than 8 1/4 per cent.

Taking the entire system worked under this organization the tons carried were 16,522,823, an increase of 16 per cent. in tons and 10.73 per cent. in ton miles. The average rate was 0.68 cent. The passengers were 7,731,049, an increase of 3.64 per cent. and of 7.84 per cent. in passenger miles.

In renewals 9,118 tons of new rails and 399,000 ties were used. The work of replacing iron bridges with stone was continued. The most important piece of work begun during the year was the enlargement for double track of two tunnels on the Pittsburgh Division. This work will be completed during the year, and is the last work of that character required for double tracking the Pittsburgh Division. The material excavated for the tunnels was largely used in filling a big trestle on the new Cumberland branch, which was originally 2,126 ft. long with an average depth of 24 ft. This has been now entirely replaced by a bank.

This company is one of the few in the country which keeps up an employees' voluntary relief department. During the year there were 3,676 accessions to the membership in this department, being 3,571 in excess of the number of deaths and withdrawals. The number of members leaving the service was 1,620 and the net gain for the year was 1,951, making a total membership at the close of the year 8,680. Members contributed \$152,133 for the support of the association. The railroad company contributed \$30,278. The payments in death benefits and for sickness and accidents amounted to \$138,291 and for working expenses \$27,286. The contribution by the railroad company was mostly used for working expenses of the department, but the sum of \$2,991 was paid for extra benefit to members whose disabilities continued over 52 weeks.

General Electric Company.—This company's fourth annual report, for the year ending Jan. 31, 1896, shows courageous dealing with an extraordinary business under extraordinary circumstances. The following statements are abbreviated from the company's report:

Assets.	
Patents and franchises (cost \$3,592,625.04).....	\$3,960,000.00
Factory plants at Schenectady, New York, Lynn and Harrison, including 70,000 acres of land and 1,350,000 feet of floor space, cost \$3,958,523.21.....	3,468,002.00
Real estate, other than factory plants.....	453,584.63
Stocks and bonds, par \$13,619,005.80.....	5,479,332.23
Notes and accounts receivable, par \$11,158,751.50.....	6,384,123.30
Work in progress.....	961,386.38
Inventories and consignments, cost \$4,321,075.09.....	4,219,883.66
Cash.....	879,685.75
Deficit Jan. 31, 1896.....	13,917,071.48
	\$43,963,069.43

Liabilities.	
Capital stock, common, \$30,480,000; preferred, \$1,252,000.....	\$34,712,000.00
Five per cent. debentures.....	8,750,000.00
Accrued interest and accounts payable.....	501,069.43
	\$13,953,069.43

The methods of bookkeeping and appraisal for the purpose of this balance sheet were heroic, and the report of the Second Vice-President, who has charge of the accounts, is quite a model of candor and compressed detail. The tremendous charges to profit and loss are shown in the list of assets. In dealing with the big figures of stocks and bonds and notes and accounts it is easy to see how an optimistic bookkeeper could have appraised more liberally and have so converted the deficit into a surplus.

The item of stocks and bonds includes 253 lots, being, naturally, the securities of lighting, power, manufactur-

ing, selling and patent owning organizations with which the parent company has large dealings. One hundred and twenty of these lots of securities are carried on the books at \$1 each, simply for the purpose of keeping track of them, and because their value, if any, is prospective. That they have a value, however, is shown by the fact that \$41,646.77 was realized from these "dollar" stocks and bonds last year. Similarly 436 debtors (notes and accounts amounting to \$2,432,860.88) are carried on the books at only \$1 each.

The item Inventories and Consignments includes raw materials, at market prices, and partly finished and finished apparatus. It represents about four months' output, which is not excessive at this time of the year. In brief the result of the year's business was as follows:

Gross earnings for the year.....	\$13,315,067.12
Less cost of goods, legal, patent and general expenses.....	11,759,837.08
Net earnings.....	\$1,555,230.04
Interest paid less interest received.....	\$16,159.40
Losses.....	27,178.31
Depreciation on inventories of materials, factory plants, patents, etc.....	634,526.81
	\$878,164.55

Surplus for the year.....	\$877,645.49
Deficit last year.....	14,794,716.97

Present deficit.....\$13,917,071.48

The year's business was an increase, in dollars, of ten per cent. over that of the previous year, while the increase in output was more than thirty per cent. The officers consider that in selling price the bottom has certainly been reached, and also that there will be appreciation, rather than shrinkage, in the appraisal of their securities and properties. We should hope so. It must have been a weary grind to charge off so many millions to profit and loss account. Of the growth of the business the report says:

"In view of the improvements made in various directions, we estimate that the capacity of our plants has increased at least 25 per cent. during the year. Our output in kilowatts has increased in greater proportion, owing partly to the larger size of the average generator and motor constructed and partly to the growth of business. The output for the year ending Jan. 31, 1895, in round numbers, was 275,000 kilowatts (368,000 H. P.) and for the year ending Jan. 31, 1896, 380,000 kilowatts (509,000 H. P.), an increase of over 35 per cent."

Some of the notable engineering work of the year is referred to in the report, as, for instance, the supplying of 60,000 H. P. of apparatus for converting water power into electricity and transmitting to distant points, as at Sacramento, 4,000 H. P., 24 miles; Fresno, 1,400 H. P., 35 miles; Portland, 1,800 H. P., 14 miles; Pachucha, 2,350 H. P., 23 miles.

"We have also supplied the Carborundum Company and the Carbide Manufacturing Company of Niagara with what are undoubtedly the largest electrical transformers in the world. The transformer sold to the Carborundum Company is of 830 kw. capacity (1,112 H. P.), and is used for the production of carborundum, the new substitute for emery. The transformer supplied the Carbide Company was but slightly smaller in size and is for the production of the calcium carbide, which is used in the manufacture of acetylene gas.

"In general, the demand, as indicated by many of the installations mentioned above, has been for a largely increased size of electrical unit, whether of generator, motor or transformer. While a few years ago a generator of 200 H. P. was considered large, we have built during the past year or had on order Feb. 1 some 30 generators of 1,000 H. P. and over."

The Vice-President in charge of the sales department announces with proper pride:

"We have over 10,000 customers, from whom we received a total of 104,000 separate orders, a daily average of about 350.

"Besides our regular supply business, which comprehends not less than 9,000 separate articles, including renewal and repair parts of machines, we sold nearly 12,000 complete machines, having a total capacity of about 500,000 H. P. These figures include over 8,500 street car motors and over 90,000 H. P. of railway generators. We also sold nearly six million incandescent lamps, over twenty-seven thousand meters and other auxiliary apparatus and supplies in proportion.

The statement is made that during the past year the company has not borrowed money, or endorsed paper for discount, or used its credit in any way, direct or indirect and that all accounts due are paid.

March Accidents.

Our record of train accidents in March, given in this number includes 57 collisions, 72 derailments and 5 other accidents, a total of 134 accidents, in which 28 persons were killed and 95 injured. The detailed list, printed on another page, contains accounts only of the more important of these accidents. All which caused no deaths or injuries to persons are omitted, except where the circumstances of the accident, as reported, make it of special interest.

These accidents are classified as follows:

	Collisions:	Rear.	But-ting.	Cross-ing and other.	Total.
Trains breaking in two.....	10	0	0	0	10
Misplaced switch.....	3	0	0	5	8
Failure to give or observe signal.....	1	0	0	0	1
Mistake in giving or understand-ing orders.....	0	4	0	0	4
Miscellaneous.....	13	3	4	4	11
Unexplained.....	13	4	6	23	23
Total.....	31	11	15	57	57
Derailments.					
Broken rail.....	5				5
Loose or spread rail.....	2				2
Defective bridge.....	1				1
Defective switch.....	1				1
Bad track.....	1				1
Broken wheel.....	1				1
Broken axle.....	5				5
Broken truck.....	6				6
Failure of drawbar.....	1				1
Broken car.....	2				2
Runaway train.....	1				1
Derailing switch.....				1	1
Animals on track.....				1	1
Landslide.....				2	2
Snow or ice.....				5	5
Washout.....				1	1
Malicious obstruction.....				1	1
Maliciously misap'ed switch.....				2	2
Accidental obstruction.....				3	3
Unexplained.....				20	20
					57

OTHER ACCIDENTS.

Boiler explosion.....	1
Cylinder explosion.....	1
Breakages of rolling stock.....	1
Other causes.....	2
Total number of accidents.....	5

Total number of accidents..... 134

A general classification shows:

	Colli- sions.	Derail- ments.	Other accid's.	Total.	P. c.
Defects of road.....	10	10	0	20	15
Defects of equipment.....	10	15	4	29	21
Negligence in operating.....	24	2	0	26	19
Unforeseen obstructions.....	0	15	1	16	12
Unexplained.....	23	30	0	53	40
Total.....	67	72	5	144	100

The number of trains involved is as follows:

	Colli- sions.	Derail- ments.	Other accid's.	Total.
Passenger.....	20	14	3	37
Freight and other.....	77	59	2	138
Total.....	97	73	5	175

The casualties may be divided as follows:

	Colli- sions.	Derail- ments.	Other accid's.	Total.
Killed:				
Employees.....	10	3	0	13
Passengers.....	0	0	0	0
Others.....	4	2	4	10
Total.....	14	10	4	28
Injured:				
Employees.....	27	20	2	49
Passengers.....	33	10	0	43
Others.....	2	1	0	3
Total.....	62	31	2	95

The casualties to passengers and employees, when divided according to classes of causes, appear as follows:

	Pass. Killed.	Pass. Injured.	Emp. Killed.	Emp. Injured.
Defects of road.....	0	6	0	5
Defects of equipment.....	0	0	4	1
Negligence in operating.....	0	33	12	30
Unforeseen obstructions and maliciousness.....	0	3	1	7
Unexplained.....	0	1	1	6
Total.....	0	43	18	49

Fifteen accidents caused the death of one or more persons each, and 29 caused injury but not death, leaving 90 (67 per cent. of the whole) which caused no personal injury deemed worthy of record.

The comparison with March of the previous five years shows:

	1896.	1895.	1894.	1893.	1892.	1891.
Collisions.....	57	36	40	72	75	74
Derailments.....	72	81	68	102	107	128
Other accidents.....	5	9	4	12	12	10
Total accidents.....	134	126	112	186	194	212
Employees killed.....	18	21	17	36	37	35
Others killed.....	10	2	5	4	3	9
Total killed.....	28	23	22	40	40	44
Employees injured.....	49	61	63	71	93	95
Others injured.....	46	19	23	114	100	85
Total injured.....	95	80	86	185	193	180
Passenger trains involved	37	36	33	73	68	81

Average per day:

Accidents.....	4.32	4.06	3.61	6.00	6.23	6.84
Killed.....	0.90	0.74	0.71	1.29	1.29	1.42
Injured.....	3.06	2.58	2.77	5.97	6.22	6.16

Average per accident:

Killed.....	0.51	0.18	0.19	0.21	0.20	0.20
Injured.....	0.71	0.63	0.76	0.99	0.99	0.90

We find no report of any passenger killed in March. There was none killed in February and one in January. The worst accident in March was the collision near Dock-low, Pa., on the 17th, which was reported in the *Railroad Gazette* of April 3, page 235. We have to report another disastrous boiler explosion, that at Gum Run, Pa., March 11. It is said that the coroner's jury decided, on expert testimony, that the water in this boiler had been allowed to get too low, but this view is disputed by other experts. At Eastman, Ga., a passenger train was derailed by the very unusual cause of a mail bag striking a switch stand and loosening the switch. Near Jersey City, on the "meadows," March 3, a passenger was blown off the platform of a car by a high wind, and on the following day there was a similar accident in the same locality on another road. Both these passengers were badly injured, but we have not heard that either has died. Ten tramps were killed in freight train accidents.

We have reports of 21 accidents on electric and street railroads in March. The worst one, killing several people, was near St. Louis on March 8, and was reported in the *Railroad Gazette* of the 27th, page 218. A circumstance of interest in connection with this disaster is the report, recently printed, that the attorney of the railroad company informs passengers who were injured in the collision that they had better take whatever recompense he offers them, as the company will have to go into insolvency if it tries to pay anywhere near the amount usually allowed for damages in such cases. The number of persons reported killed in street car accidents in March is 4, and of injured 61, though 50 of the latter are charged to the St. Louis collision. How many of these 50 cases were what would be classed as serious, we do not know. Seven of the street car accidents occurred in New York City, which suggests something defective in the theory that New York is very much behind the times in the adoption of "electric rapid transit." Five of the seven accidents were, however, to cars propelled by cable. One was due to careless running in a country district. Of the other street car accidents in the United States, three were runaways of electric cars. At Cincinnati, on the 10th, a car was derailed while going at a lively rate of speed in consequence, it is said, of "the rocking motion of the car." There were seven collisions; one derailment, due to a misplaced switch; one case of a freight train running into a street car and one of a street car running into a freight.

Employees of the Erie road at Binghamton are filled with anxiety, so the newspapers say, on account of the discharge of certain heads of departments, and others. Says a press dispatch:

For the last few weeks the heads of the departments of the Erie Railroad in this city have, one by one, been ushered out of the service, and new and cheaper men have been employed to fill the positions. The same thing has happened in Elmira. The night Yard Master, day Yard Master, Freight Agent Finch, who had seen 32 years of continuous service, and the foreman of the repair shops have been removed. The discharge of Finch so worried the man that he attempted suicide by shooting himself, but was unsuccessful. The head carpenter at Elmira, and the division foreman of carpenters in that place, who had seen 35 years with the Erie, were also displaced. In some cases there may have been reasons, such as unsteady habits, lack of executive ability or amiability as a disciplinarian, but in others there is apparently no reason for the company's action.

This account is worthy of note by reason of the exhibition of discernment on the part of the reporter. We do not know how much he has padded the article with pure filling, but when he speaks of the lack of two such important qualifications as executive ability and amiability as a disciplinarian and the possession of such, disqualifications as "unsteady habits," he "gives away" his case, more completely, perhaps, than he thinks. We hasten to congratulate "labor" on this accession of wisdom by one of its newspaper advocates. Many editors think that they must print several columns of gossip whenever they have one paragraph of news of this kind, and when such an editor begins to realize that the "right to be hired" is limited by the amiability and the executive ability of the candidate, there is hope that, sometime, common sense may again rule in the newspaper treatment of questions of work and wages. It is not surprising if, after a time, considerable numbers of inefficient men have to be removed all at once. Such clearings-out are likely to occur when a new manager takes the reins. The reader may recollect that a new manager was appointed on the Erie not long ago.

The Providence Journal has come out with an argument against the proposed Summer street station at Boston, and it prints a large map showing that it will not be impossible to acquire real estate to enlarge the grounds of the Park Square station sufficiently to make room for a train shed 600 ft. wide. Attention is called to the fact that the widening of the Boston & Albany road-way from Dartmouth street to Albany street, which would be necessary in connection with the construction of the Summer street station, could be done only by the purchase of "a mile of brick buildings." The seven-million-dollar subway, now in course of construction, was begun largely for the purpose of making better communication between Park Square and Causeway street, and the abandonment of the present Providence station at Park Square would have the effect of throwing away a good part of the benefit which it was expected would be derived from the subway. The Summer street location is spoken of as an out-of-the-way place, and one from which the business center is gradually receding. The obvious defect of the Journal's plan is that it does not provide for the Old Colony road. Assuming, however, as some do, that the union of the Old Colony with the Albany and Providence roads is not a vital necessity, the scheme for the enlargement of the Park Square terminal is probably subject to serious criticism in not providing for adequate yard room outside the train shed. A considerable amount of ground is allotted to this purpose, but probably it would still be necessary to have many of the storage tracks farther from the station than will be necessary if the Summer street plan is carried out. The Journal estimates the cost of the ground, which it proposes to have bought, at \$2,000,000, or about one-half the estimated cost of real estate necessary for the Summer street plan.

We ask especial attention to the reports of the meeting of the Air Brake Men's Association, which are continued in our pages this week, and more of which we shall publish next week. The committee reports are singularly good papers. They show not merely knowledge of the subject, but hard work in preparation. We venture to say that a great many higher officers will be surprised at the quality of the work done by these committees. Another matter in connection with the report of the convention which is worth a moment's attention is that these active and hardy young men got to work at 8 o'clock in the morning.

In the announcement of the St. Louis meeting of the American Society of Mechanical Engineers are two phrases which suggest the march of events. One is informed that bicycles will be provided for a run along the boulevard if a sufficient party can be made up; and also that carriages and bicycles for the ladies and their escorts will be provided. We fancy the venerable but stalwart President, the genial Secretary and the wise members of the Council, clad in knickerbockers and appropriate stockings darting through the streets of St. Louis to the amazement and delight of the natives. Of course the ladies of the party will appear in circumspect petticoats; bloomers are unthinkable. But the question of dress may safely be left to the individual, with the advice and approval of the Council. The main point is that actual conditions have been recognized by the Committee of Arrangements. Perhaps the committees who look out for the comfort of the Master Car Builders and Master Mechanics and their wives and daughters, at Saratoga, will take a lesson from the Mechanical Engineers.

NEW PUBLICATIONS.

Rope Driving: A Treatise on the Transmission of Power by Means of Fibrous Ropes. By John J. Flather, Ph.D., M.M.E., Professor of Mechanical Engineering, Purdue University. New York: John Wiley & Sons; London: Chapman & Hall, Limited. 230 pages; illustrations and index. Price, \$2.

Professor Flather says in his preface that this book has been prepared to meet the need of a comprehensive manual of practical information on rope-driving and the principles upon which it rests. So far as we know there was no such manual in any language, and Professor Flather's book is not only useful, but unique. It is not open to the criticism that we must so often make that it adds but another volume to a literature already overburdened. A good deal of information on the subject has been printed incidentally in other books and in papers before engineering societies and in the technical journals, and of this information the author has made free use, and he has added to the value of his book by specific references in foot-notes to the sources of his information. Most of his data has, however, been collected from original sources, and he makes especial acknowledgment to Mr. C. W. Hunt and Mr. Spencer Miller. A great amount of knowledge of theory and practice has been gathered in compact form and is made available by an analytical table of contents and a good index. A special table of contents gives the titles of the 22 tables embodied in the text.

Professor Flather apparently accepts the general opinion that the loss in rope transmission is from 5 to 10 per cent. greater than with gearing; but there are advantages which often compensate. The quiet working and convenience in application, the freedom from risk of break down and the steady motion are the chief of these advantages.

The first four chapters are given to detailed descriptions, with drawings, of various arrangements of engines and rope drives in different works, and to a short discussion of the transmission of power by ropes to moderate distances—say a few hundred feet. The descriptions of details are minute enough to be valuable to the designer, and there are 10 useful pages on splicing. The next three chapters are on the material, manufacture and life and strength of ropes.

The four chapters which follow deal with the horse power which may be transmitted, the deflection of ropes and the losses in rope driving. These are largely analytical. The last chapter, of 45 pages, describes the construction of rope pulleys, and this is largely a chapter of experience and of specific examples.

On the whole Professor Flather has produced a sound and unpretentious little book, all through which we see evidence of a desire, not to display knowledge, but to ascertain and clearly set forth facts; and for such a book the world is always grateful.

TRADE CATALOGUES.

Bridges, Dredging Plants, Etc.—The San Francisco Bridge Co., and the New York Dredging Co., 42 Market street, San Francisco and World Building, New York, have issued an illustrated catalogue showing some of the work done by the companies. The San Francisco Bridge Co. was established in 1877, the New York Dredging Co. in 1893. In the introduction to this pamphlet it is said that during the past 18 years the San Francisco Bridge Co. has executed work to the aggregate value of more than 20 million dollars. Therefore, it is hardly necessary to publish such a catalogue to introduce the company to municipalities and engineers. Out of nearly 600 contracts executed only 30 are mentioned in this catalogue, these being chosen to illustrate the general scope and range of the business. The first illustration is of the hydraulic dredge Oakland working in Oakland Harbor and discharging material ashore through a pipe line 5.70 ft. long. Within the past five years this machine has dug and put ashore more than 3,000,000 cu. yds. of material. Another interesting work shown is the celebrated Fraser River cantilever bridge. This was designed by Mr. C. C. Schneider, C. E., and manufactured at Gateshead-on-the-Tyne, England, and was erected by the San Francisco Bridge Co. under contract with Mr. Andrew Onderdonk. Several ocean piers are shown, also hydraulic dredges built for various places. Two rather remarkable examples of canal excavation are illustrated, as is also the new union depot and ferryhouse at San Francisco, the foundation of which was built in 1894 and 1895 by the San Francisco Bridge Co. This foundation called for 5,117 piles, 16 in. in diameter and 80 ft. long. These were driven with a steam hammer 20 ft. below the water. On these are concrete piers and arches, the construction of which consumed 30,000 cubic yards of concrete and 200 tons of iron tie rods. The total cost of the foundation was about \$400,000. A very interesting work mentioned in the catalogue is filling a railroad trestle for the South Pacific Coast Railroad Co. (Southern Pacific System). This fill is 7,000 ft. long, 150 ft. wide and averages about 10 ft. deep. It was made by material discharged by the hydraulic dredger Oakland.

The Lidgerwood Rapid Unloader.—The Lidgerwood Manufacturing Co., of 96 Liberty street, New York, has issued a new pamphlet designed to call attention to the Lidgerwood rapid unloader, which is adapted for unloading dirt, ballast, etc., from flat cars in railroad work. This arrangement was patented Sept. 20, 1892, and was described at considerable length in our columns in De-

ember of that year. The illustrations in the pamphlet are largely from photographs taken on the line of the Delaware & Hudson Canal Company's Railroad and are intended to illustrate the working of the device from the first shovel load of dirt to the empty cars returning to be loaded. The unloading apparatus consists of a compound geared hoisting engine, cable and plow. The engine is specially designed for the work, with 10 x 12 in. cylinders capable of exerting a pull on the cable of 25 tons and drawing it at a speed of 125 ft. a minute. This engine is placed on the forward car of the train and the cable is run back to the plow at the other end of the train. Then the material is plowed off the cars by winding up on a hoisting engine. This method of unloading has several advantages. A smooth and steady pull is secured and is less liable to break the cable than where the plow is hauled by a locomotive; the cars do not have to be braked, the locomotive does not need to be detached; any locomotive strong enough to pull a train will answer. The makers say that by actual test two mogul locomotives failed to unload by the old method a trainload of frozen clay after trying three hours. The rapid unloader unloaded an identical trainload in seven minutes.

Illinois Railroad Commissioners' Report.

The Railroad and Warehouse Commissioners, of Illinois, W. S. Cantrell, Thomas Gahan and George W. Fithian, have made the 25th annual report of the Commission, and advance sheets of the main body of the report have been issued. It opens with a sketch of the history of the Board and its doings for the quarter century now ended. From the first the Commission claimed and exercised the right to regulate rates, and the courts sustained it in 1871. The railroads have not always been entirely satisfied with the rates prescribed by the Commissioners, but they admit that competition with each other and the influence of interstate rates have contributed to the unsatisfactory results. The Commissioners enlarge upon the great benefit of the railroads to the state, and they estimate that the value of the lands of the state has been enhanced \$25 an acre by the presence of the railroads. More than 90 per cent. of all the lands of the state are now within five miles of a railroad.

The total length of railroad in the state June 30, 1895, was 10,472 miles, or about 17 per cent. of the entire railroad mileage of the United States. During the year ending June 30, 12 passengers, 175 employees and 443 other persons were killed and 155 passengers, 1,433 employees and 460 other persons were injured. The Commissioners point with pride to the fact that only one passenger out of 63,000,000 was killed, but as it does not appear but that the whole of the 12 reported were killed by accidents due to their own negligence, it seems likely that this statement does not do justice to the railroads. The number killed in train accidents is not stated.

The revision of the freight classification of the state, which was ordered by the Commissioners in July last, is described at length. Only 21 complaints have been brought before the Board during the year. The prominent cases are briefly mentioned. The physical condition of the railroads has been fairly well kept up. As a very thorough inspection was made in 1893 and 1894 a less critical examination was made in 1895, no special trains being asked for. There are now 115 interlocking plants in the state, of which 14 were built during the year ending Dec. 1, 1895. Fifteen others are in process of construction. The report urges the necessity of legislation to prevent the construction of unnecessary new railroads. The chapter on this subject was printed in the *Railroad Gazette* of March 13.

The pamphlet containing the advance sheets has about 30 direct process cuts showing bridges, station buildings, locomotives, signals and other structures and fixtures on the important railroads of the state.

Boiler Explosion at Bridgeport, Ala.

The cuts printed herewith show some of the results of the explosion of the boiler of a freight engine of the Nashville, Chattanooga & St. Louis Railway at Bridgeport, Ala., on Feb. 20 last. The scene in Fig. 1, showing a piece of the firebox lodged against a building, is about 100 ft. from the point where the engine stood.

This engine was consolidation type and was built by the Baldwin Locomotive Works in 1884. It was overhauled in January, 1895; and in January, 1896, when it was in the shop for the purpose of having the boiler

cleaned out, 42 broken staybolts were replaced. The engineman and fireman were instantly killed by the explosion. At a point some 17 miles north of Bridgeport, a short time before the explosion, as appears from what they told a brakeman, they "heard something pop," a noise so loud that they stopped and tried to find the cause of it, but discovered nothing wrong. This statement, with what may be inferred from the preceding statement about renewal of staybolts, is the only information we have tending to throw light on the cause

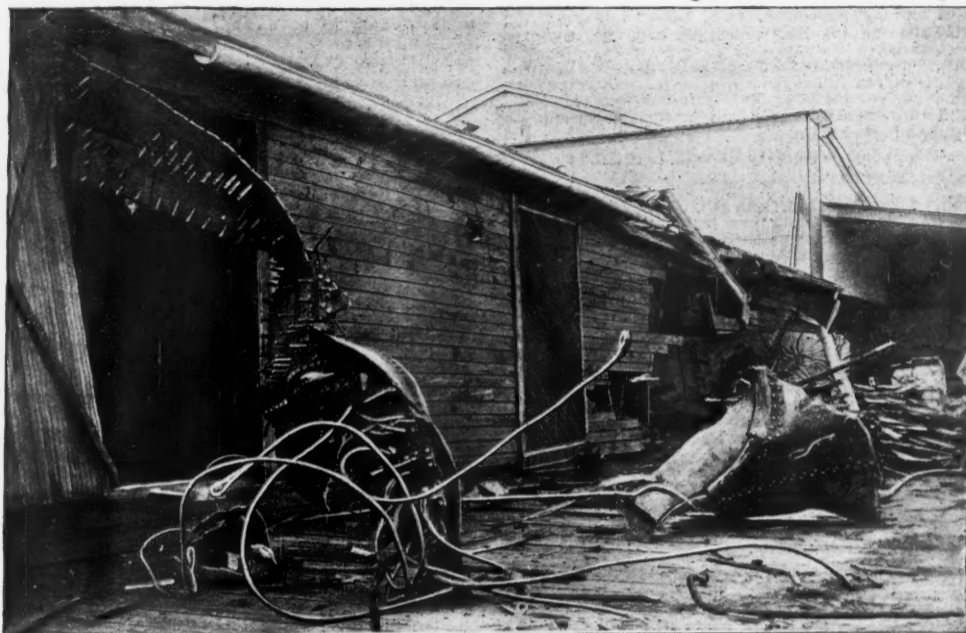


Fig. 1.—Result of Locomotive Boiler Explosion at Bridgeport, Ala.

of the explosion. The rear driving axle of the engine was bent by the shock, and one of the frames was broken in two places. A heavy rail in the track beneath the engine was broken in three places.

Train Accidents in the United States in March.

COLLISIONS.

REAR.

1st, 5 a. m., on Louisville & Nashville, near Forest Ala., north bound passenger train No. 2 ran into two

19th, on Pennsylvania road, at Shawmont, Pa., a passenger train ran into the rear of a preceding freight, damaging engine and caboose. Several persons were injured.

20th, on Western Maryland, at Fulton, Md., a freight train ascending a grade broke in two, and the rear portion was stopped in a tunnel soon after 10 other cars broke away from the foremost portion, and ran back into the rear portion, derailing 5 cars and blocking both tracks in the tunnel. A brakeman was killed.

21st, on Missouri Pacific, near Marquette, Kan., a freight train broke in two and the foremost part being stopped soon after at a tank, was run into by the rear portion, damaging several cars. Two tramps were badly injured.

26th, on Pittsburgh, Fort Wayne & Chicago, at Salem, O., a freight train entering a side track was run into at the rear by a following freight; engine and 12 cars wrecked; one brakeman injured.

30th, on Union Pacific, near Breckinridge, Col., an empty engine running a short distance ahead of a passenger train was unexpectedly stopped, to pick up a flagman, and was run into at the rear by the passenger train, doing slight damage. The passenger engineer jump off before the collision occurred and fell under the wheels, and was killed.

And 18 others on 16 roads, involving 3 passenger and 25 freight and other trains.

BUTTING.

4th, 2 p. m., on New York Central & Hudson River, near Syracuse, N. Y., butting collision of passenger trains, badly damaging both engines and one baggage car; both enginemen injured. It is said that there was a misunderstanding of orders.

10th, on Northern Central, at Penbryn, Pa., butting collision of freight trains; brakeman killed, fireman injured. It is said that the northbound train disregarded a meeting order.

12th, on New York, New Haven & Hartford, near Kent, Conn., butting collision between a snow plow and a local freight train; conductor killed and 2 other employees injured.

13th, on Southern Pacific, at Golconda, Nev., butting collision of passenger trains, badly damaging both engines and both baggage cars. One engineman and one fireman were injured. This was the meeting point for these trains and the eastbound had come to a stop, but the other approached at uncontrollable speed in consequence, it is said, of trouble with the brakes.

16th, night, on St. Louis & San Francisco, at Rogers, Ark., a passenger train, moving slowly, ran over a misplaced switch and into the head of a special officers' train standing on the side track, doing slight damage. A brakeman of the passenger train riding on the front platform of the baggage car, watching for tramps, was killed, the air cylinder falling off the tender and striking him on the head. The General Superintendent of the road, on his way from the special train to the station, a few minutes before, had seen that the switch was properly set for the main track.

21st, 2 p. m., on Manhattan Elevated, at 110th street and Columbus avenue, New York City, on a sharp curve, butting collision between a southbound express passenger train and a northbound empty engine, damaging both engines and one passenger car. Both enginemen and one fireman were injured, all being more or less scalded. The trains were on the third track, which is used for running in both directions. A high building, recently erected, shortens the view of the line at this point.

And 5 others on 5 roads, involving 10 freight and other trains.

CROSSING AND MISCELLANEOUS.

2d, on Southern Pacific, at Stockton, Cal., a switching freight train ran over a misplaced switch and into the head of a freight train, making a bad wreck. Three trainmen were injured, 2 very badly.

3d, at a crossing in Kansas City, Kan., a train of the Chicago Great Western ran into a freight train of the Kansas City Suburban Belt road, wrecking 2 freight cars and 1 engine. Two trainmen were injured, one of them fatally.

13th, on Terre Haute & Indianapolis, at Center Point,

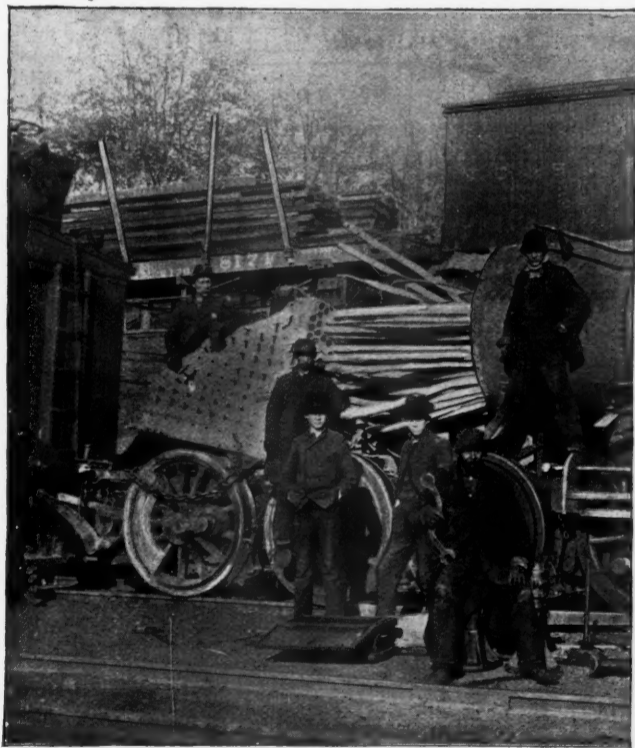


Fig. 2.—Nashville, Chattanooga & St. Louis Engine No. 92; After Explosion of Feb. 20.

carloads of logs which had run out from a siding upon the main track, wrecking the engine and badly damaging the baggage car. The engineman and fireman were fatally scalded.

2d, on Pennsylvania road, at Columbia, Pa., a freight train ran into the rear of a preceding freight, badly damaging the engine and 5 cars; fireman injured.

3d, on Pennsylvania road, near Black Lick, Pa., a freight train descending a grade broke in two and the rear portion afterward ran into the forward one, wrecking 10 cars. A brakeman was injured.

5th, on Southern Railway, near Shelton, S. C., a freight train descending a grade broke in two and the rear portion afterward ran into the forward one, wrecking 11 cars. A brakeman was killed.

6th, on Central of New Jersey, at Coplay, Pa., a freight train ran over a misplaced switch and into the rear of another freight train, derailing 20 cars, which fell off a bridge into the Lehigh River.

Ind., a train carrying miners was making a running switch when the passenger car ran into the forward part of a train, making a bad wreck. Five passengers and 2 trainmen were seriously injured.

17th, 4 a. m., on Pennsylvania road, near Docklow, Pa., eastbound passenger train No. 4 ran into the side of a stock train which had just been thrown upon the passenger track by a misplaced switch, and the first 4 cars of the passenger train and the front portion of the freight train were piled up in a very bad wreck. The passenger engineman and fireman were killed and 19 passengers were injured.

25th, on Philadelphia, Wilmington & Baltimore, near the Union station, Baltimore, Md., a passenger train ran beyond the fouling point at a junction and into the rear car of another passenger train, badly damaging the engine and one car. Six passengers and one employee were injured.

30th, on Southern Railway, at Salisbury, N. C., a passenger train ran into a switching engine, damaging both engines and several cars. Two trainmen were injured.

And 9 others on 8 roads, involving 4 passenger and 13 freight and other trains.

DERAILMENTS.

DEFECTS OF ROAD.

16th, on Pennsylvania road, at Coburn, Pa., a freight train was derailed by a broken rail and 5 cars fell down a bank. Two trainmen were injured.

19th, on Chicago, Burlington & Kansas City, near Carrollton, Mo., a mixed train was derailed and the passenger cars and 3 freight cars fell down a bank; conductor and 1 passenger injured. It is said that the accident was due to a broken rail.

23d, on Oregon Short Line, near Shoshone, Idaho, a passenger train was derailed by a broken rail and an officers' car at the rear was considerably damaged. The superintendent and 3 passengers were injured.

24th, on Rockport, Langdon & Northern, near Rockport, Mo., a mixed train was derailed by spreading of rails and the passenger cars and 2 cars of cattle fell down a bank. The conductor and 2 passengers were injured.

31st, on Denver & Rio Grande, near Lumberton, N. M., a passenger train ran upon a burning bridge and the engine and mail car fell to the stream below. The engine succeeded in slackening the speed so that the remainder of the train stopped before it reached the bridge.

And 5 others on 5 roads, involving 5 freight and other trains.

DEFECTS OF EQUIPMENT.

22d, on Florida, Central & Peninsular, near Madison, Fla., a freight train was derailed by a broken truck and 12 cars were ditched. Two tramps were killed and one injured.

And 14 others on 13 roads, involving 2 passenger and 12 freight and other trains.

NEGLIGENCE IN OPERATING.

7th, on Erie road, at Lima, O., a freight train was ditched and the engine overturned, at a derailing switch, and the engineman, fireman and one brakeman were injured. There was a blinding snowstorm at the time.

16th, 7 p. m., on New York, Ontario & Western, at Star Light, Pa., a long freight train became uncontrollable in descending a steep grade and the third car from the engine was derailed, wrecking itself and 33 other cars, some of which fell down a high bank. The engineman and conductor, who was setting brakes, were killed.

UNFORESEEN OBSTRUCTIONS.

1st, on New England road, near Forestville, Conn., a freight train was derailed at a washout and the engine and 7 cars were overturned. A brakeman was injured.

3d, on Long Island road, near New Lots, L. I., a passenger train drawn by two engines was derailed in a snow drift and 2 trainmen and one passenger were injured.

7th, on Southern Pacific, near Puente, Cal., the Sunset Limited express train, running at high speed, was derailed by running over a horse; no one injured.

18th, on Louisville & Nashville, near Livingston, Ky., a passenger train was derailed by a rock which had fallen upon the track, and the engine was overturned. The engineman was killed.

20th, on Pennsylvania road, at South Williamsport, Pa., a freight train was derailed by a malicious obstruction on the track and the engine and 9 cars were wrecked.

26th, 4 a. m., on Southern Railway, at Eastman, Ga., a passenger train was derailed at a misplaced switch and part of the cars ran against some empty freight cars on a side track. Two passengers and one trainman were injured. It is said that the switch was misplaced by being struck by a mail bag which was thrown out of a car in the front portion of this train.

29th, 6 a. m., on Long Island road, at Bath Junction, N. Y., a work train was derailed by an accidental obstruction; engineman and fireman injured.

And 8 others on 8 roads, involving 4 passenger and 4 freight trains.

UNEXPLAINED.

7th, 8 p. m., on Southern California, near Del Mar, Cal., a passenger train was derailed by the breaking of the flange of a tender wheel, making a very bad wreck. A fire started in the baggage car, and the whole wreck was burned up. Two trainmen were injured.

16th, on Georgia, Carolina & Northern, near Abbeville, S. C., a freight train was derailed and a brakeman was injured.

19th, on Philadelphia, Reading & New England, at Boston Corners, N. Y., a freight train was derailed, and the engine and 4 cars fell down a bank. The conductor was injured.

25th, on Lehigh Valley, near Canastota, N. Y., a freight train was derailed and 11 cars fell down a high bank. A brakeman was injured.

25th, on Indiana, Illinois & Iowa, near North Judson, Ind., a freight train was derailed, making a bad wreck. The dead bodies of 4 tramps were found in a car of grain, where they had been suffocated.

30th, on Chicago & Alton, near La Rose, Ill., a freight train was derailed and 5 cars ditched; conductor and one passenger injured.

And 24 others on 18 roads, including 1 passenger train and 23 freight and other trains.

OTHER ACCIDENTS.

11th, 1 p. m., on Delaware, Susquehanna & Schuylkill, at Gum Run, Pa., the locomotive of a freight train was wrecked by the explosion of its boiler, and the engineman, fireman and 2 brakemen were killed and the conductor injured. The engine was a Wooten type, built in 1891. A coroner's jury decided that the explosion was due to low water, but others think the cause was defective staybolts.

19th, on Chicago, Milwaukee & St. Paul, at Chicago, the baggage car of a passenger train was damaged by

the explosion of a trunk which had just been put into the car. The baggageman was burned.

And 3 others on 3 roads, involving 2 passenger trains and 1 freight.

A summary will be found in another column.

A Ship Canal Bill.

On the 15th of this month Senator Elkins introduced in the United States Senate a bill to provide for the construction of the Maryland & Delaware free ship canal. The project is for a canal to connect the waters of the Chesapeake and Delaware bays. It is to be not less than 100 ft. wide at the bottom and 178 ft. wide at low water level, and it is to be 30 ft. deep below mean low water. The bill authorizes the Secretary of War to appoint a commission to select the most desirable of the three central routes known as the Southeast Creek route, the Centerville route and the Queenstown route. The bill carries an appropriation of one million dollars.

This, as the reader doubtless knows, is a very old project. As long ago as 1807, during the administration of President Jefferson, Secretary Gallatin recommended a ship canal along the Atlantic coast, and in 1820 a company was formed to build a canal to join the Chesapeake Bay and the Delaware River, and in 1829 a canal was completed at a cost of \$2,200,000, one-fifth of which was paid by the United States Government. This canal, known as the Chesapeake & Delaware Canal, is about 16 miles long, 36 ft. wide on the bottom with an average depth of 10 ft. of water and having three locks.

In 1872 a company was formed to build a ship canal across the peninsula and in 1874 a survey and estimates were made by Mr. B. H. Latrobe, Chief Engineer of the company. In 1878 surveys were begun by engineers of the United States Government and several reports were made to Congress as the result of this work before 1882.

The surveyed routes were six in number. A pretty complete account of these enterprises, with a map showing the various routes, will be found in the *Railroad Gazette* of Nov. 9, 1894, page 768.

In 1894 the President appointed a Board to make studies for a Chesapeake & Delaware ship canal and report to Congress through the Secretary of War. This Board consisted of the late General Casey, then Chief of Engineers; Colonel (now General) Craighill, then President of the American Society of Civil Engineers; Mr. Mendes Cohen, ex-President of the American Society of Civil Engineers; Capt. Geo. Dewey, U. S. N., and Mr. J. Alexander Porter. In December of 1894 this Board reported in favor of the Black Creek route, virtually the line of the present Chesapeake & Delaware Canal.

This is the most northern of the various routes suggested. It would be the most easily defended and also the cheapest, having only 13.66 miles of canal against 16.20 by the Sassafras route and 50.93 by the Centerville route. The latter was thought to be the most favorable to the export trade of Baltimore, although the estimated time of transit from Baltimore to a common point at sea, 12 miles outside the Delaware breakwater, is only half an hour more by the Black Creek route. The more southerly route, however, was thought to be less liable to obstruction by ice.

Elliott's Electrically Locked Switch Stand.

This device, of which a front view is shown in Fig. 1, and a section in Fig. 2, is designed to put the control of a switch in the hands of a signalman or operator located at a distant station.

As will be seen by reference to the perspective view, Fig. 3 the arrangement used is that of a lock bar attached to the points of the switch and a plunger fastened to the stand. The movement of the plunger *G*, Fig. 2, is controlled by means of a magnet, *K*, the armature of which, when down, drops into a notch cut in a slide *I* and locks it, the slide being connected to the plunger by a crank *H*, which is used to lift the plunger when the slide is released. When the magnet is energized, by the closing of the electric circuit by the operator, the armature will be attracted and lifted out of the notch, allowing the slide to be pulled back, the plunger lifted and the switch unlocked.

The lock bar, *F*, Fig. 1, which is moved by the switch rails, is attached to the head rod of the switch in the same manner as the connecting rod, one bolt being used for both. The other end of the lock bar is made to pass through a guide *f*, Fig. 2, fastened to a plate bolted to the bottom of the stand. The bar, and with it the switch rails, is securely locked whenever the bar is brought into a position where the plunger, *G*, can drop through the hole drilled in it.

To insure that the switch when closed will always be locked (unless released by the operator) the upper end of the plunger, *G*, is brought up under the switch lever in such a way that the switch cannot be set for the main

track and locked in the usual manner without forcing the plunger down through the lock bar.

To show when the armature has been raised and the electric lock released, a small indicator is provided which will drop and show white behind a glass set in the side of the magnet box, as soon as the slide is released; any one desiring to use the switch only has to watch the indicator, and need not try the handle.

The indicator having shown white, to work the switch, levers *D* and *H* are raised simultaneously, the raising of *D* allowing the plunger *G* to be raised at the same time. Raising *G* withdraws it from the hole in the lock bar before the switch lever has cleared the slot in the stand. Immediately the switch lever *D* has been raised to a horizontal position, and turned slightly, the lock lever *H* can be dropped and the switch turned in the usual manner.

To enable the distant operator to know when the switch has been opened, and also if it has been properly closed, a circuit breaker is provided in the magnet box, which breaks the circuit through the magnet as soon as the slide *I* has been partly withdrawn. A disk indicator, placed in the tower or office, is put in the circuit to show whether the circuit is complete or broken. When the switch is at any great distance away, magneto bells or a telephone can be provided for purposes of communication, the wires used for locking the switch being available for this purpose.

This switch lock, which has been patented by Mr. W. H. Elliott, Signal Engineer of the Chicago, Milwaukee & St. Paul, has been in use for over a year and has given excellent results. As will readily be seen, the circuit used is of the simplest kind, and if properly installed and cared for failures must be exceedingly rare. In case of failure all that it is necessary to do to put the electric locking feature out of service, is to unscrew the bolt

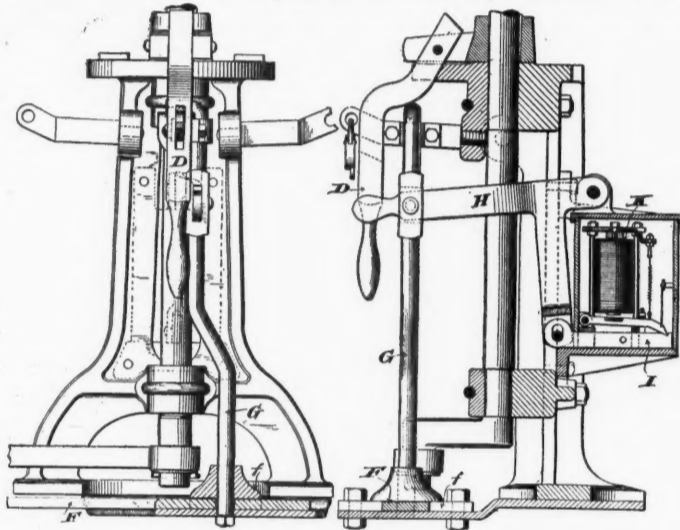


Fig. 1.

Fig. 2.

Elliott's Electrically-Locked Switch Stand.

fastening the lock bar to the head rod of the switch, when the stand and switch can be operated in the usual manner.

The Cost of Calcium Carbide.

We mentioned last week the fact that the *Progressive Age* (280 Broadway, New York), had sent a commission to Spray, N. C., to ascertain precisely how calcium carbide is made and what it costs to make it—surely a most important study. This commission consisted of Prof. E. J. Houston, Dr. Arthur E. Kennelly and Dr. L. P. Kinnicutt. The names of Professor Houston and Dr. Kennelly are at once recognized as being among the first in electric science. Dr. Kinnicutt is a graduate of the Massachusetts Institute of Technology, who made post-graduate studies in Germany, and has since been a teacher of chemistry at Harvard and at the Worcester Polytechnic Institute. These gentlemen made a thorough study of the subject on the spot, and their report appears in the *Progressive Age* of April 15. The editor introduces it with some information, historical and industrial, concerning the uses of acetylene gas.

The commissioners describe the plant at Spray and the method of making the calcium carbide, all of which is known in a general way to our readers. Two runs were made for the commissioners, producing in one case 226½ lbs. of gross calcium carbide and 216½ lbs. net; in the other case the return was 203 lbs. gross and 193 lbs. net. Samples of the materials put in the furnaces and of carbide which resulted were taken, and we understand the results of quantitative analysis are to be published later.

The interesting point now is the estimate of cost at which the commissioners arrive. Taking the Spray plant as it exists, charging off 5 per cent. interest, 5 per cent. depreciation and repairs on electric plant and turbine, 6 per cent. on counter-shafting, building, rolls and crusher, and 20 per cent. on furnaces, and assuming that the plant is run 365 days a year and 24 hours a day, the estimate of cost of the calcium carbide is \$32.77 per ton of 2,000 lbs. of gross carbide. One ton is the possible output of the plant in one day of 24 hours. The net carbide resulting from the tests and on which this estimate is

based, gave an average yield of 4.926 cu. ft. of moist acetylene gas per pound; pure calcium carbide should yield theoretically 6 cu. ft. The yield, therefore, of the net carbide produced in these experiments would be 82.1 of the theoretical yield; the gross carbide yielded 78.36 per cent. The acetylene, however, was practically pure. This estimate is signed by the three members of the Commission.

A supplemental report is made by Messrs. Houston and Kennelly, who endeavored to find what calcium carbide would cost if produced under more favorable conditions. The works at Spray are experimental; the freight charges on material are heavy; therefore, these gentlemen have assumed a plant capable of producing 10,000 lbs. of gross carbide of calcium a day, and run 300 days in the year, by water power. They assume the water power at \$5 per horse power per annum at the turbine shaft, including ground rent. They assume coke at \$2.75 per ton, lime at \$2.50 per ton, carbon for electrodes at six cents a pound. On this basis they estimate that a ton of 2,000 lbs. of gross carbide can be produced for \$20.04. "The cost of producing calcium carbide electrically is evidently limited by the cost of the lime, coke and electric power, no matter what the scale upon which the process is conducted."

The editor completes his valuable article by adding a list of patents for making and managing calcium carbide, granted to various people within the last two years. A very complete bibliography of the subject of acetylene gas is also given. Altogether the report and the other information collected make this article a monograph of great value to those who are looking into the matter of the possible commercial use of acetylene gas. Naturally, the experts do not enter into any discussion of the prices at which calcium carbide must be produced in order that acetylene gas can compete with water gas; nor do they say anything about the value of the patents on the various processes.

Foreign Railroad Notes.

During the great Berlin Exhibition, which is to open May Day next, the Prussian State Railroads will sell on one day of each week, and on the busier lines two days in each week, round-trip tickets to Berlin good for 10 days, and on all trains, at half the regular price. It is expected that there will be also some special exhibition trains.

The first Austrian Railroad Minister, Chevalier von Guttenberg, was born in 1841, entered the Austrian army as an engineer officer, served as chief of the railroad office of the General Staff, was sent to study the railroads of Germany, Russia and the East, had great influence in the organization of the Austrian State Railroad service and for 10 years past has been chief of the Railroad Department in the Ministry of War.

There was a great exhibition last year at Lübeck, 39 miles from Hamburg, and to give the poorer classes a chance to visit it, a special train made of transformed freight cars was put on Sundays, leaving Hamburg at 8 a. m. and Lübeck at 10:15 p. m., taking 93 minutes for the run. The fare was 48 cents for the round trip, and the fair entrance Sunday was 12 cents. In the 14 Sundays that this train ran it carried 18,802 passengers, so that the average trainload was no less than 1,329 passengers. The number of cars adapted was 40, made to seat 1,760 passengers, but not more than 1,650 tickets were sold for one trip. The cost of arranging the cars with seats, etc., was only about \$17 each. Longitudinal benches were put on the sides of the car, and central double benches (facing both ways). Such cars are to be used all over Europe for carrying soldiers in time of war, and the experience is interesting as showing what can be done with them.

TECHNICAL.

Manufacturing and Business.

The E. D. Albro Co., of Cincinnati, O., have just received a large number of logs of mahogany and other hard woods, and are showing some of the handsomest veneers that they have had for some time. Business is reported as very good.

John N. Porge, of Cincinnati, O., has recently received an order for 25 8-in. water columns for one railroad. A number of other orders are on hand, and he reports the demand for his improved 1895 water column as being satisfactory.

The Stillwell & Bierce Co., of Dayton, O., have received an order for 150 steam pumps for water stations from the Russian Government, for the Trans-Siberian Railroad.

The Merrill-Stevens Manufacturing Co., of Niles, Mich., is busy on a number of orders for cattle guards, and report that business has opened up better this year than for several years past.

The foot guard manufactured by the National Foot Guard Co., of Columbus, O., has been adopted by 22 railroads and is in use on as many more. The demand for it is steadily increasing.

The Buckeye Malleable Iron & Coupler Co., of Columbus, O., has been forced to consider large additions to its works so that the plant can keep up with its orders for car couplers. Three new buildings will be erected,

60 ft. x 300 ft., 35 ft. x 124 ft., and 60 ft. x 60 ft. respectively. The present plant will be remodelled and all the buildings will be newly equipped with modern machinery and appliances. When the additions and changes are complete the works will have a capacity of about 10,000 car couplers a month.

The Q & C Co., of Chicago, announces the removal of its New York office to the twentieth floor of the American Surety Building, 100 Broadway.

The Providence Steam Engine Co., of Providence, R. I., builders of the Improved Greene Engine, are still much rushed with new work. Recent sales they report as follows: Goodyear Rubber Co., Middletown, Conn., one 375-H. P. engine; Nonotuck Paper Co., Holyoke, Mass., two 75 H. P. engines; Suburban Railroad Co., Chicago, one 350 and one 500-H. P. tandem compound engine; Atlanta Cotton Mills, Atlanta, Ga., two 700-H. P.; North American Rubber Co., Setucket, N. Y., 150-H. P.; New London Street Railway Co., New London, Conn., two 400-H. P.; Hampton & Old Point Railway Co., Hampton, Va., one 300-H. P. tandem compound; Glenark Knitting Co., Woonsocket, R. I., 150-H. P.; Union Cotton Mills, Union, S. C., 1500-H. P. cross compound; Pilling Manufacturing Co., Philadelphia, Pa., 75-H. P.; American Baptist Publishing Co., Philadelphia, Pa., 130-H. P.; Second Avenue Traction Co., Pittsburgh, Pa., two 750-H. P. tandem compounds; Ponemah Mills, Taftville, Conn., two 400-H. P.; W. C. Baker, Providence,



Fig. 3.—Elliott's Electrically-Locked Switch Stand.

R. I.; two 100-H. P.; Oakville Co., Waterbury, Conn., one 75-H. P.; Merrimack Paper Co., Lawrence, Mass., one 300-H. P.

Willis Shaw, with office in the New York Life Building, Chicago, has just shipped a car of hoisting machinery to Willard & Cornwell, Guthrie, Okla., to be used on their contract with the Atchison road there. He has also sold to the Crystal Glen Rock Crushing Co., at Warsaw, Ill., the machinery for its new plant, comprising rock drills, dump cars, Pen Argyl hoisting engine, etc., and a complete rock crushing plant to Christie & Lowe, for their work on the Regulating Works at Lockport, Ill.

H. H. McDuffee, representing the Interchangeable Brake Beam Co., the Truss Rail Joint Co. and the Fontaine Crossing & Electrical Co., has moved his Chicago office from the Rookery Building to No. 1118 Marquette Building, corner Adams and Dearborn streets.

The annual meeting of the stockholders of the Joseph Dixon Crucible Co. was held at the company's main office, Jersey City, N. J., April 20, and out of a possible vote of 7,345 shares 7,320 shares were voted for the reelection of the old Board, consisting of Edward F. C. Young, John A. Walker, Daniel T. Hoag, Richard Butler, William Murray, Alexander T. McGill and Jerome D. Gillet. President E. F. C. Young, Vice-President and Treasurer John A. Walker and Secretary George E. Long were re-elected by the Directors.

The sale of the plant of the New York Frog & Switch Co., of Hoboken, to James Forsyth, by the receiver, has been confirmed by the New Jersey Courts. The purchaser assumes the mortgages and pays a sum in cash. The total amount is about \$38,000. The property has been in the hands of the receiver for a year.

The Universal Construction Co., of Chicago, has recently been organized and has leased the "North Works" of the Illinois Steel Company in the city of Chicago. The company will manufacture structural steel and

special shapes, giving especial attention to the bridge building, railroad and contracting business. The President of the company is Mr. W. R. Stirling, Vice-President of the Illinois Steel Co. The General Manager is Mr. F. Heron, who is also one of the directors of the company. He has been with the Phoenix Iron Company for the last nine years and was for a long time associated with the Homestead Works in Pittsburgh. Mr. Edward Haupt, the Secretary, has also been with the Phoenix Iron Co. for some years. The stock of the company has been subscribed largely by Chicago interests, but Eastern capital is also represented in the company. The plant of the company is being rapidly put in order and will probably be put in operation within 30 days. The fitting shop is being operated in the meantime with material supplied from the works of the Illinois Steel Company and purchased in the open market. The new company, though independent of the Illinois Steel Co., will, of course, be more or less directly connected with it through mutual interests and as a large consumer of both raw material and finished products of the Illinois Steel Co. It is explained that the officers of the latter company have been so busily engaged in the last three years in developing the five other plants of the company that they have been able to give little time to the structural business. As that involves a great amount of detail they have decided that it would be more advantageous to lease the North Works plant to a responsible corporation rather than enter upon this branch of business themselves, and, as already stated, the Universal Construction Co. has secured the lease of the works to carry on this business.

Benner & Opdyke, engineers and contractors, of Philadelphia, announce the removal of their main office to 1222 Belmont avenue, near the works and yards of the firm on the line of the Pennsylvania Railroad. A branch office will be continued at 1430 South Penn square. The business of the firm as general contractors for bridges and buildings of all descriptions will be continued as before.

The firm of A. Whitney & Sons, car wheel manufacturers, of Philadelphia, is to be reorganized, but there will be no interruption to the business. A member of the firm this week said that owing to legal complications, there had been issued against the firm an execution for \$30,000; that there had been in progress negotiations for a reorganization of the business of the firm by placing it in the hands of a stock company, the capital of which was being subscribed. These arrangements it is expected will be completed, and the execution was merely an incident of the reorganization. About five years ago the firm made a suspension, and the claims of creditors were extended. Default on the interest of some of the notes issued at that time appears to have brought about the present trouble.

New Stations and Shops.

The contract for the building the new Union station of the New York, New Haven & Hartford at Providence, R. I., was awarded this week to Horton & Hemingway, of Providence, for a sum approximating \$500,000. The officers of the railroad company decided to let all the work involved in building the station to one firm, which will let sub-contracts for the various classes of work. The structure is to be completed by June 1, 1897. The main building will be 500 ft. long by 100 ft., and of mottled brick with trimmings of granite and Long Meadow stone. For the interior glazed brick will be used, the woodwork being of red oak. Besides the main structure there will be two buildings 60 ft. x 125 ft., one at each end of the station, to provide accommodations for the express companies and for officers.

Jersey City Water-Supply Again.

The Street and Water Board will advertise at once for a new water-supply under the specifications prepared by Mr. C. C. Vermeule. The plans are similar to the specifications under which bids were last invited. The principal difference is that, while the old specifications called for a pipe line with a daily capacity of 50,000,000 gals., the new specifications require an immediate supply of only 35,000,000 gals. daily. The Commissioners believe that, with this reduction of supply, they can secure a reduction of \$1,000,000 in the cost of the pipe line. Bids will be received at the meeting to be held Monday, May 18.

Boston Subway.

Bids for building Section 6 of the subway in Tremont street, Boston, will be received at the office of the Transit Commissioner until 12 o'clock m. of Thursday, May 7, 1896. It is intended that most of the work shall be done by tunneling, and little of the surface can be occupied during the day. The section is approximately 1,085 ft. long. The subway from near Scollay Square to Hamilton Place, a distance of about 1,085 ft., will consist of masonry side walls and a masonry arch spanning two tracks. From thence to the junction with the work already built in front of Park street church there will be two single-track subways, of construction similar to that of the two-track portion—each being about 50 ft. long. The inner dimensions of these subways will be approximately as follows: Two-track 18 ft. in height from invert, 23 ft. to 30-ft. span; easterly single-track, 16 ft. in height from invert and 13-ft. span; westerly single-track, 16 ft. in height from invert and 15-ft. span. The depth from the surface of the street to the bottom of the subway is approximately from 26 to 35 ft. Some other items are estimated to be as follows: 28,000 cu. yds. earth excavation; 125 tons iron and steel, furnished by the Commission, to be set in place; 10,800 cu. yds. concrete and brick masonry.

The Compound Locomotives on the St. Gothard.

With the new compound locomotives the time of express trains on the St. Gothard Railroad, between Lucerne and Chiasso, has been reduced from 6 to 4½ hours. An average speed of 37 miles an hour is maintained with these engines, varying from 25 to 31 miles on the inclines and reaching 65 miles on the levels. The train consists of six parlor cars and one baggage car hauled by two locomotives which weigh 132,000 lbs. each.

Coupler Litigation.

The hearing of the appeal of the Trojan Car Coupler Co. from the recent decision of Judge Coxe, at which time, at the request of the Gould Coupler Co., he granted a preliminary injunction against the Trojan Car Coupler Co., has again gone over. The case, having previously gone over from the April term, was made a preferred case, and it was expected that it would have been heard April 20, both sides having had time for preparation. The Gould Coupler Co., however, was not ready to argue the case, and the hearing was postponed until Friday, the 24th inst.

THE SCRAP HEAP.

Notes.

The National Express Company has made a contract with the Brooklyn Heights (Electric) Street Railroad of Brooklyn, N. Y., by which cars for express business will be run over all the lines of that road in the city of Brooklyn, trips being made several times a day.

In the Common Council of Philadelphia Mr. Hawkes has introduced a bill to borrow \$3,000,000 to abolish grade crossings on the Philadelphia, Germantown & Norristown road. It is not clear how much weight should be attached to this proposition, as the bill says nothing about the plan for carrying out the work.

The New York, New Haven & Hartford has built a second main track on the Air Line Division for about six miles eastward from the Connecticut River at Portland, Conn., so that hereafter the five-hour express trains between Boston and New York can meet and pass each other, when both are on time, without stopping.

The Legislature of New York has passed a law broadening the act of May 17, 1893, known as the anti-trust law. As it now stands amended, every corporation, or officer thereof, making any agreement for the purpose of preventing competition in the supply or price of any article in common use, or that shall attempt any business pursuant to any such contract, shall be deemed guilty of a misdemeanor.

The Mississippi River in Minnesota was very high last week, and at Royalton, Minn., an important bridge was swept away. A dozen bridges were carried away in the region about St. Cloud. On the same day floods prevailed throughout large sections of the Province of Quebec, and a bridge of the Quebec Central Railroad over the St. Francis River near Sherbrooke, 600 ft. long, was carried away. Another one was destroyed at St. Anselme, 21 miles south of Levis. A number of highway bridges were destroyed.

At Spokane, recently, County Treasurer Mudgett attached a Pullman sleeping car for the purpose of collecting a tax from the owner, but the road, the Northern Pacific, which was in the possession of the car, being in the hands of the United States Court, the judge of the court was appealed to, and he fined Mr. Mudgett \$25 and costs for contempt of court. Judge Hanford, in imposing the fine, said he did it as a warning to others. Mr. Mudgett, however, congratulates himself on the fact that he got the tax money.

Governor Morton, of New York, has signed the law compelling railroads to carry bicycles for nothing. The success of this raid in New York has emboldened the promoters of similar schemes in other states, and a Committee of the Massachusetts Legislature is expected to at once draft a similar law. The Springfield Republican, one of the few papers whose editors do some square thinking now and then, calls the attention of the people of the state to the fact that such a scheme as this, to benefit bicycle owners at the expense of passengers who travel without such "baggage," blocks the way to the hoped-for general reduction of fares. In Ohio the Senate has passed a bill similar to the New York law. At St. Louis the League of American Wheelmen has begun proceedings in the courts to compel the Missouri Pacific to carry a bicycle free for a passenger.

The Metric System in England.

In the Transactions of the North-East Coast Institution of Engineers and Shipbuilders there is published a communication by Mr. G. H. Baines on the report of the House of Commons Committee on the metric system. It is pointed out that evidence was given before the committee by about 20 witnesses representing official, commercial, manufacturing, trade, educational, and professional interests, and these were practically unanimous in favor of the change. The engineers included Mr. Alex. Siemens, Mr. Emerson Dowson, Captain Sankey, and Sir Benjamin Baker, all of whom favored the change, while Sir Frederick Bramwell proposed to have the old and the metric system running side by side. Lord Kelvin's testimony was that the present was a "brain-weakening and time-wasting system which ought to be abolished." It may be added that the London Association for the Protection of Trade, which has about 4,000 members, the majority of whom are retail traders, has sent a petition to Parliament urging that the recommendations of the Select Committee should be adopted. The Rochdale Merchants' and Tradesmen's Association has petitioned outright for the compulsory adoption of the metric system. The Edinburgh Merchants' Association, the Hull Guardian Society, the Association of Trade Protection Societies, the Manchester Guardian Society, and the Munster Merchants' Associations, all representing re-

tailers rather than merchants, have expressed themselves in favor of the change; and similar institutions in many other towns have passed resolutions for the adoption of the metric weights and measures. In Liverpool the Cotton Association, Corn Trade Association, General Brokers' Association, Salt Chamber of Commerce, Ship Owners' Association, West India Association, Wool-brokers' Association, Warehouse Association, Provision Trade Association, and the Iron and General Metal Trades Section of the Liverpool Chamber of Commerce have expressed themselves in favor of the recommendations of the Select Committee. From all this it looks as though something might be done at last. The few outstanding nations are fast adopting the metric system, so that soon England and the United States will stand alone in resisting it.—*The Electrical Engineer* (London).

Right of the New York Railroad Commission to Forbid Railroad Building.

The Appellate Division of the Supreme Court of New York, Third Division, has delivered an opinion sustaining the State Railroad Commissioners in their refusal to issue a certificate of necessity and convenience to the Depew & Southwestern Railroad Company. This company and the Terminal Railway of Buffalo applied for a certificate over the same route, at the same time, and the Commissioners decided to grant only one certificate. The Court says:

"Both applications for certificates having been made at the same time, I think the Railroad Commissioners had the legal right to consider them together, without regard to who had filed their articles of association first."

"The burden is upon the Depew & Southwestern Company to show error. . . . We cannot consider the evidence as if we were determining the matter in the first instance; some weight and importance must be attached to the decision of the Commissioners, and the burden is upon the Depew & Southwestern to show to us that the decision of the Commissioners was contrary to the clear weight of evidence."

"To reverse their decision upon certiorari we must find that there was such a preponderance of evidence adverse to the conclusion they arrived at, that if it had been the verdict of a jury, we would set it aside as against the weight of evidence. I can find no such preponderance of evidence."

"My conclusion, therefore, is that the action of the Board of Railroad Commissioners in refusing to issue the certificate cannot be reviewed by us in these proceedings, because their action did not finally determine the rights of the company, and because another means is provided by law whereby their decision could be adequately reviewed, and also because at the time of issuing the writ herein, a proceeding to review the action of the Railroad Commissioners, in the manner prescribed by law, was then pending and undecided."

The law says that a road thus being refused may present its application to a General Term of the Supreme Court, and the court shall have power to order the certificate issued; so that it would seem that the present decision settles nothing except legal technicalities connected with the method of procedure.

South American Notes.

The exports from Argentina for 1895 aggregated \$119,000,000 gold, being the largest on record, the next largest exportation being in the year 1892, when the value was \$112,700,000. The exports of wheat for 1895 amounted to 1,010,000 tons, being a decrease from 1894, but the exports of flour increased from 40,758 to 53,935 tons, and of oats from 1,665 tons in 1894 to 17,897 tons in 1895. The total shipments of agricultural products last year reached 2,268,848 tons.

The famous case of Messrs. Punchard, McTaggart, Lowther & Co., of London, against the Colombian Government, over the Antioquia Railroad, has reached a crisis. An arbitration court had been arranged to consider the matter, and this was broken up by the withdrawal of the German Minister to Colombia, acting under instructions from his government. The British Minister then urged that the case be adjudicated by some court outside of Colombia, which the Colombian Government very properly declined to grant. Judging from published reports by both parties to the dispute, it appears that the contract to build this road for the magnificent figure of some \$80,000 a mile was obtained through corruption of Antioquian officials, and while the matter of a private contract could hardly be dragged into a court of international arbitration, the hesitancy of the Colombians to mete out justice to both sides impartially is unfortunate. There are principles at stake here which will affect the future investment of capital in the construction of the roads which Colombia so sorely needs.

Sir Henry Tyler, in his recent report to the Peruvian Corporation, Limited, urges that a narrow-gauge road from Oroya to Tarma be built, following the example of the Antofagasta & Bolivia Railroad. Rather curiously he does not suggest the prolongation of the Lima & Oroya Railroad to Cerro de Pasco, the great center of Peruvian silver mining, whose possibilities as a large producer have been so ably proven by Mr. A. D. Hodges, Jr., of Boston. To reach this point would seem to be the principal justification for the enormous expenditure involved in carrying the Central Railroad across the mountains to Oroya. Sir Henry Tyler apparently looks mainly to the effect of railroad extension eastward to the valleys on the Amazonian side of the mountains, evidently forgetting that railroads as promoters of colonization have not played the same part in South America which similar roads have done in the United States. He does recognize, however, the absurdity of relying upon railroads from middle and western Peru to navigable water on the Amazon for the creation of a new route eastward across the continent to reach the European markets and he points out that the distance from the great Peruvian commercial centers to Europe is less by way of the west coast to Panama, than by way of the Amazon. From the report in hand the condition of the Peruvian roads would appear to be excellent, but little hope is extended for immediate increase of the present systems.

Burning of Old 32d Street Station, Philadelphia.

The old Pennsylvania Railroad passenger station at Thirty-second and Market streets, West Philadelphia, and the train shed, together with eight Pullman cars and about 30 passenger coaches, were totally destroyed by fire on April 18. Two firemen were killed by falling walls and over a dozen others were injured. The loss is estimated at \$225,000. The fire started at 4:30 o'clock, presumably from an explosion of gasoline in a coal bin under the train shed, and it spread rapidly. Three alarms were turned in and the firemen, aided by at least 500 employees of the Pennsylvania Railroad shops, nearby, fought the flames, but without effect. The fire raged for six hours, and was not extinguished until midnight. The building was occupied by some of the railroad company's offices, and valuable records and plans were destroyed. The commissary department of the Pullman

Company was also located in the building. The structure was abandoned as a station in 1881, when the Broad street station was completed. There were 16 tracks in the train shed, and these were filled with cars when the fire started. Travel on the Philadelphia, Wilmington & Baltimore, the tracks of which run close to the old station, was delayed for several hours. The building and train shed covered 10 acres of ground.

A Costa Rican Railroad Project.

There was incorporated at Denver last week a company called the Costa Rica Improvement Co., with William A. Lynn and Francis C. Hatch, of New York; F. C. Gay and Charles A. Marriner, of Los Angeles, and Charles W. Franklin, of Denver, as incorporators. The company proposes to construct a road from the city of San Jose, Costa Rica, in a westerly direction to the Pacific Ocean. The company also has the right to engage in mining and manufacturing.

A Lecture on Signals.

Mr. Charles Hansel, Vice-President and General Manager of the National Switch & Signal Company, lectured before the engineering department of Lafayette College on Thursday evening, April 9, on block signaling and interlocking. His lecture was illustrated by working models and drawings.

Penalty for Carrying Diseased Cattle.

The Supreme Court of Kansas has decided against the railroad in the cases of Charles Haber and 142 other cattlemen in Lyon, Chase and other counties, who sued the Missouri, Kansas & Texas railroad and others for shipping Texas cattle into the grazing country and spreading disease among their stock. The case was tried in the district court of Lyon County, where the cattlemen obtained a verdict for \$50,000 damages, including interest. The defendants appealed to the Supreme Court, and that tribunal has sustained the decision of the lower court. The railroad company claimed that it was in no sense liable for the damages, because it had been compelled to accept and transport the cattle; also that liability against it would not hold because the cattle were brought into and unloaded in the state upon certificates issued by Albert Dean, of Kansas City, acting under authority from the Secretary of Agriculture and the United States Bureau of Animal Industry, also the State Live Stock Sanitary Commission of Kansas. The company also set up the claim that it had no knowledge of the disease existing among the cattle, and further insisted that no conduct on its part contributed to the loss and damage.

Associate Justice Allen held that the permits referred to afford no protection to the company and that the trial judge did not err in excluding them. The syllabus by the court says, in part: "The act of Congress of May 29, 1884, for the establishment of a bureau of animal industry does not repeal or nullify the various acts of the Kansas Legislature designed to protect domestic cattle. There is no conflict between either the act of Congress or the regulations established by the Secretary of Agriculture and the laws of this state which prohibit the bringing into the state of cattle capable of communicating or liable to impart Texas, splenic or Spanish fever. 'All persons injured by the shipping into this state of cattle capable of communicating Texas fever may join in an action against the owner of the cattle communicating such disease, for the purpose of recovering damages . . . and the liens of all persons entitled to recover against the owner of the cattle may be adjusted in one action.'

Engines for Queensland Government Railroads.

A deputation of the Ironworkers' Association recently waited on the Queensland Minister for Works to urge upon the Government the desirability of accepting the tenders of Queensland firms for the manufacture of the 40 locomotives required by the railway department. Mr. Philips stated at the outset that the Government intended, if possible, to have all the engines built in the colony. The Government had been trying to arrange for the work to be divided among Queensland firms, and had merely cabled to English firms for prices, as a guide during the consideration of the tenders. It subsequently transpired that 10 of the locomotives had been ordered from England, and that the difference in price between the locomotives which are to be made locally and the 10 ordered from the Yorkshire Engineering Company was £670 each. Two imported engines are to be delivered in six months, and the remainder in nine months.—*New South Wales Railway Budget*.

Station Service and Safety on the London & South Western.

At the annual dinner of the Head Quarters Staff and Station Masters of the L. & S. W. Ry., Sir Charles Scotter, General Manager, when moving the toast of the evening, "The Station-Masters of the L. & S. W.," remarked that at Waterloo, Mr. Hilditch had under his charge quite a little army. There were 37 parcels clerks, 25 booking clerks, 18 telegraph clerks, 19 inspectors, and the rank and file, porters, shunters, cleaners, and other men on the permanent staff of the company, no less than 504, so that about 600 men were permanently engaged in carrying on the work at Waterloo Station alone. As an instance of what that work was, Sir Charles stated that the Saturday before Whit-Monday 945 trains, and on Whit-Monday 985 trains passed in and out of Waterloo Station in the 24 hours, and that without the slightest accident of any kind or description. During the last five years the South Western had carried 285 millions of people, and during that time they had never killed a single passenger, whereas in the streets of London alone between 200 and 300 people were killed every year. In 1892, which was the last published record, 247 people were killed in the streets of London, whereas that particular year on the whole of the railways in the country, carrying thousands of millions of people, only five passengers were killed. That seemed to show that there was some truth in the statement that the safest place a person could get into was a railway carriage. Last year they carried on the South Western 62,000,000 people, and during the last five years the passenger traffic has increased at the rate of 2,000,000 a year. The South Western was essentially a passenger line, and nothing did more to promote the passenger traffic of a railway than a reputation for safety and punctuality, both of which the South Western had well earned.—*The Railway Engineer*.

Lake Notes.

The passenger service of the fine express ship's of the Northern Steamship Co. begins June 9, with the departure of the *North Land* from Duluth. The sailing days will be Tuesdays and Saturdays through the season. The ships will leave Buffalo Fridays and Tuesdays, after a stay there of about eight hours, making their long stay, 21 hours, at Duluth, where they will provision. Coal will be taken at Cleveland and The Sault. All the business of the company will be transacted at Duluth, to which point the general offices have been moved.

The six 2,500-ton steel freight ships of the company are to be supplemented by two 4,000-ton boats for the flour traffic this season, and by several others on occasional trips.

Besides ore, of which from 10 to 11 million tons will be moved, there will be very much more traffic from the upper lakes than ever before. About 100 million feet of lumber are now on Duluth docks sold for delivery at lower lakes, and as much more at other points above the Sault Canal. The shipments of flour will exceed 6,000,000 barrels and may be very much more than that. Over eight million bushels of wheat are contracted for immediate delivery at Buffalo from Duluth on the opening of navigation, and 19,000,000 bushels are in store in elevator there and at Superior, most of which will go forward before the beginning of the new crop. Over four million bushels of Canadian wheat will go forward. About three million tons of coal will come into Lake Superior during the season. With all this the amount of package freight that must be handled is said by traffic managers to be greater than ever before. To accommodate this new traffic the shipyards of the lakes have been employing 7,000 men all winter and have contracts in hand that they will not entirely complete till the middle of summer. Season ore contracts have been made from Escanaba at 55 cents, and from the head of Lake Superior at \$1.10 and \$1.10. Few vessel men are willing to take contracts.

Lake Iron Mines.

The Duluth, South Shore & Atlantic road has let a contract for the demolition of a 100-pocket ore dock at St. Ignace, Lake Michigan, and the replacement by a lumber dock. This is the end of all ore shipping from St. Ignace.

The Chicago & Northwestern road has completed a 226-pocket dock, 54 ft. high, at Escanaba, costing about \$250,000. It gives the port a storage capacity for 160,000 tons of ore.

The Minnesota Iron Co. has in stock pile at its various mines 1,200,000 tons, an amount never before approached. It is making sales of ore at prices varying from \$3.50 to \$4.55 a ton.

About 2,000 men will soon have been discharged from mines desiring to curtail production. Unless the demand increases little more ore will be hoisted this season along the lakes.

Fast Torpedo Boats for the United States.

The Herreshoffs have offered to build for the Government 225-ton torpedo boats that will have a guaranteed speed of 30 knots. The House had authorized five 26-knot boats, to cost not over \$875,000, and the Senate committee substituted three 30-knot boats, to cost not over \$800,000. The Herreshoffs offer to build two or more such vessels for \$215,000 each, or \$645,000 for three, and Secretary of the Navy Herbert has recommended that three additional boats such as the Herreshoffs offer to build be built.

Armor for Battleships.

The specifications for armor for the Kearsarge and Kentucky have been approved by Secretary Herbert, and bids for the material, 2,800 tons, will be opened May 2d. In addition to this quantity the department also seeks bids for 30 tons of nuts and bolts. Most of the armor must be treated by the Harvey process of face hardening. The armor varies in thickness from 2 in. to 17 in., the latter being used on the 13-in. gun turrets of each ship. Armor must be delivered at the rate of 300 tons a month, and a penalty of \$10 per ton is exacted for delay. The armor is to be of nickel steel. The department will furnish nickel in the form of nickel oxide, or other suitable form, free of cost, to the armor contractor, and bids are to be made on this basis.

LOCOMOTIVE BUILDING.

The Michigan Central is reported to be in the market for a large number of engines, for as many as 40 according to some reports.

The Chicago, Milwaukee & St. Paul has recently given an order for two heavy engines to the Baldwin Locomotive Works. They will have Krupp wheels and tires.

The Rocky Hill Stone Storage Co., 50 Broadway, New York City, has ordered a second locomotive for use at the quarries at Rocky Hill, N. J., from H. K. Porter & Co., Pittsburgh, Pa. The cylinders will be 9 in. x 14 in.

The Baldwin Locomotive Works have closed another important contract with the Russian Government for 60 freight engines to be completed by July 1. With the completion of this contract the firm will have constructed since October, 1885, 134 locomotives for the Russians. The previous orders have all been filled.

CAR BUILDING.

The Chicago & Great Western is reported to be in the market for 200 furniture cars.

Haskell & Barker, of Michigan City, Ind., are reported to have an order for 150 furniture cars from the Chicago & Northwestern.

At the shops of the company, Chester, S. C., the Chester & Lenoir is building a number of new freight cars. A number of new passenger coaches will be ordered shortly.

The receivers of the Philadelphia & Reading applied to the United States Court at Philadelphia on Monday of this week for authority to order 1,000 additional coal cars, 25 refrigerator cars, 250 gondolas and 250 box cars.

The Philadelphia & Reading has let a contract for 16 passenger coaches to the Pullman Car Company. These cars will be used on the Atlantic City Railroad between Philadelphia and Atlantic City and will be equipped with the Pynch gas and the Safety system of steam heating.

The specifications for the cars which are to be contracted for by the Baltimore & Ohio Railroad were forwarded to car builders last week, and it is expected that the contract for all, or a large part of the number of the 5,000 cars which it is proposed to build, will be awarded this month.

The Ohio Falls Car Co., of Jeffersonville, Ind., is just completing the order for 400 box cars for the Denver & Rio Grande, received some time ago. Among their cars now in the shops are two first-class passenger coaches, one baggage and mail car, and a postal car for the Louisville, New Albany & Chicago.

BRIDGE BUILDING.

Atlanta, Ga.—The Aldermen have made an additional appropriation of \$1,485 to the former appropriation of \$15,000 for building the Jones avenue bridge. This was

done in order that the contract might be awarded, as \$16,485, the bid of the Toledo Bridge Co. was the lowest submitted.

Easton, Pa.—The Standard Construction Co., of Easton, has been awarded the contract for masonry, excavation and filling for repairing the Roxburg bridge, Howell's Bridge, Zuck's Bridge, Walter's Mill Bridge and Sandt's Bridge.

Franklin, Conn.—At a town meeting it was voted to build a new bridge across the Yantic River to cost about \$3,000.

Freemansburg, Pa.—Bids will be received till May 1 by the County Commissioners for an iron bridge across the Lehigh.

Gloversville, N. Y.—The bids received for the iron work for the bridge on West Fulton street were as follows: Springfield Construction Co., \$965; Owego Bridge Co., Owego, N. Y., \$1,270; King Bridge Co., \$1,275; Groton Bridge Co., Groton, N. Y., \$1,360; Berlin Iron Bridge Co., \$1,475. The contract was awarded to the Springfield Construction Co., of Springfield, Mass.

Hartford, Conn.—The Connecticut River Bridge and Highway Commission has awarded the contract for the temporary bridge over the Connecticut River to the Berlin Iron Bridge Co. for \$37,000. If, however, the contract for the permanent bridge is given to this company it will return \$5,000 to the bridge commission. The bridge will be about 950 ft. long with eight spans.

Hempstead, L. I., N. Y.—An appropriation of \$5,000 has been voted to be expended on a bridge from Barnum Island to Long Beach.

Jefferson County, Ala.—The Commissioners have awarded to the Jasper Construction Co., of Jasper, Ala., the contracts for two bridges, one at Short's Ferry to cost \$7,150 and one at Robbins' Ferry to cost \$4,725.

Lewiston, Me.—The contract for a bridge over the Androscoggin River has been awarded to the Edgemoor Bridge Works, of Wilmington, Del., for \$45,940. The new bridge, which is to be completed by Aug. 4, is to replace the wooden one carried away recently by a freshet.

Livermore, Me.—The Massillon Bridge Co., of Toledo, O., has been awarded the contract for a bridge across the Androscoggin River to cost about \$15,000.

Macon, Ga.—Bids will be received till May 29 for building an iron bridge across the Ocmulgee River at Spring street. W. G. Smith is Clerk of the Board of Commissioners.

Mashannon, Pa.—It is stated that a new county bridge will be built here.

Middletown, Conn.—The highway bridge across the Connecticut River was opened for traffic last week. The bridge which was built by the Berlin Iron Bridge Co., is 1,300 ft. long, and has a draw span of 450 ft.

Mobile, Ala.—The County Commissioners have awarded to the Youngstown (O.) Bridge Co. the contract for the construction of five steel bridges for the county.

Morgantown, N. C.—The County Commissioners have decided to build an iron and steel bridge across John's River on the road to Lenoir Caldwell County. Plans and specifications will be prepared this week, and the contract let at once. Address the Register of Deeds, ex officio clerk to the Board.

Morgantown, W. Va.—It is said that the West Morgantown Bridge Co. is about to reconstruct its 612 ft. span suspension bridge over the Monongahela River. New cables and floor beams, which are now of wood, will be put in, and the masonry will be repaired. The plans are under the charge of S. A. Cooney, of John A. Roebling's Sons Co., New York. Bids will be received when the plans and specifications are completed.

Oneida, Ont.—Bids will be received till May 2 for an iron bridge of 80-ft. span over Mackenzie Creek. John Senn is clerk.

Oneida, Pa.—The Delaware, Susquehanna & Schuylkill will erect a stone bridge at Cranberry in the near future, and another for the mine locomotive tracks over the railroad tracks at Oneida.

Quebec, Que.—The Park, which the city is about to make of property formerly belonging to the Hotel Dieu, is to be connected by bridges with St. Roch and St. Sauveurs by bridges at the foot of Crown street and at St. Ours street.

Reading, Pa.—A resolution has been introduced in the council directing the city engineer to prepare plans and estimates for the erection of a bridge over the Lebanon Valley railroad at Front street.

South Berwick, Me.—The contract for building the new iron bridge in place of the wooden one washed away by the recent flood has been awarded to the Wrought Iron Bridge Co., of Canton, O., for \$2,841.

Tabor, N. C.—The King Bridge Co. has been awarded the contract for building a bridge over Tar River.

Taunton, Mass.—Bids for the steel bridge here were received as follows: New Columbus Bridge Co., Columbus, O., \$5,585; Horseheads Bridge Co., Horseheads, N. Y., \$6,049; Youngstown Bridge Co., Youngstown, O., \$5,600; R. F. Hawkins Iron Works, Springfield, Mass., \$5,345; J. E. Buddington, New Haven, Conn., \$5,445; Berlin Iron Bridge Co., \$5,540; King Bridge Co., \$5,645; Springfield Construction Co., \$6,149; Norton Iron Co., East Everett, Mass., \$5,255; Edgemoor Bridge Co., \$5,500; Wrought Iron Bridge Co., Canton, O., \$6,037; Dean & Westbrook, New York, \$6,125; Toledo Bridge Co., \$5,600; Boston Bridge Works, \$6,179; Variety Iron Works Co., Cleveland, O., \$5,575.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Cincinnati, Hamilton & Dayton, quarterly, 1½ per cent. on the new preferred stock, payable May 4.

Lake Erie & Western, quarterly, 1½ per cent. on the preferred stock, payable May 15.

Nashua & Lowell, 4½ per cent., payable May 1.

Nashville, Chattanooga & St. Louis, quarterly, 1 per cent., payable May 1.

Pittsburgh, Virginia & Charleston, 2 per cent., payable May 1.

Pullman Palace Car Co., quarterly, \$2 per share, payable May 15.

Western Pennsylvania, 4 per cent., payable April 15.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Alloway & Quinton, special, company's office, corner Delaware and Federal streets, Camden, N. J., May 2; annual, May 5.

Boonville Railroad Bridge Co., annual, company's office St. Louis, Mo., May 16.

Camden & Atlantic, special, company's office, Delaware and Federal streets, Camden, N. J., May 2.

Central of New Jersey, annual, company's office, Jersey City, N. J., May 8.

Chelsea Branch, special, company's office, Delaware and Federal streets, Camden, N. J., May 2.

Columbia & Port Deposit, annual, company's office, Broad street station, Philadelphia, May 4.

Delaware & Hudson Canal, annual, company's office, 21 Cortlandt street, New York, May 12.

Detroit, Lansing & Northern, annual, company's office, Grandledge, Mich., May 13.

Elmira & Lake Ontario, annual, company's office, 20 Whitehall St., New York City, May 7.

Freehold & Jamesburg Agricultural, annual, company's office, Delaware & Federal streets, Camden, N. J., May 5.

Grand Rapids, Lansing & Detroit, annual, company's office, Grandledge, Mich., May 13.

Kansas City Elevated, annual, company's office, corner Fifth street and Virginia avenue, Kansas City, May 12.

Lake Shore & Michigan Southern, annual, company's office, Cleveland, O., May 6.

Lewisburg & Pymore, company's office, Broad street, station, Philadelphia, May 4.

Michigan Central, annual, company's office, Detroit, Mich., May 7.

Missouri, Kansas & Eastern, annual, company's office, St. Louis, Mo., May 16.

Missouri, Kansas & Texas, annual, company's office, Parsons, Kan., May 20.

New York, Chicago & St. Louis, annual, company's office, Cleveland, O., May 6.

Norfolk & Western, annual, company's office, Roanoke, Va., May 6.

Philadelphia & Chester Valley, annual, office of Reading Terminal, Philadelphia, May 4.

Philadelphia, Marlton & Medford, special, company's office, Delaware and Federal streets, Camden, N. J., May 2.

St. Louis & Kansas City, annual, company's office, St. Louis, Mo., May 16.

Schuylkill & Lehigh, annual, company's office, Reading Terminal, Philadelphia, May 4.

Southern Pennsylvania Railway & Mining Co., annual, office of the Pennsylvania Railroad, Broad Street Station, Philadelphia, May 4.

Turtle Creek Valley, annual, company's office, Broad Street Station, Philadelphia, May 12.

West Jersey, special, company's office, Delaware and Federal streets, Camden, N. J., May 2.

West Jersey & Atlantic, special, company's office, Delaware & Federal streets, Camden, N. J., May 2.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Master Car Builders' Association* will hold its next convention at Congress Hall, Saratoga Springs, N. Y., beginning June 17. The rates at Congress Hall are \$3 a day for single rooms.

The *Master Mechanics' Association* will hold its next annual convention at Congress Hall, Saratoga Springs, beginning June 22.

The *Roadmasters' Association of America* will hold its next annual convention at Niagara Falls, beginning on Sept. 8.

The *Railway Signalling Club* will meet on the second Tuesday of the months of January, March, May, September and November, in Chicago. Mr. George M. Basford, is secretary, The Rookery, Chicago.

The *Western Railway Club* meets in Chicago on the third Tuesday of each month, at 2 p. m.

The *New York Railroad Club* meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The *New England Railroad Club* meets at Westeyan Hall, Bromfield street, Boston, Mass., on the second Tuesday of each month.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 3 p. m.

The *Southern and Southwestern Railway Club* meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The *Northwestern Railroad Club* meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month, at 8 p. m.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m.

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month, at 8 p. m.

The *Western Society of Engineers* meets on the first Tuesday in each month, at 8 p. m. The headquarters of the society are at 1736-1739 Monadnock Block, Chicago. The business meetings are held on the first Wednesday at its rooms. The meetings for the reading and discussion of papers are held on the third Wednesday at the Armour Institute, Thirty-third street and Armour avenue.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The *Boston Society of Civil Engineers* meets at 715 Tremont Temple, Boston, on the third Wednesday in each month, at 7:30 p. m.

The *Engineers' Club of St. Louis* meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

The *Engineering Association of the South* meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publishing House, Nashville, Tenn.

The *Engineers' Society of Western Pennsylvania* meets in the Carnegie Library Building, Allegheny, Pa., on the third Tuesday in each month, at 7:30 p. m.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Association of Engineers of Virginia* holds informal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at 8 p. m.

The *Denver Society of Civil Engineers* meets at 36 Jacobson Bock, Denver, Col., on the second Tuesday of each month except during July and August.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7.30 p. m.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday, at 8 p. m.

The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Engineers' Club of Cincinnati* meets at the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati, O., on the third Thursday in each month, at 7.30 p. m. Address P. O. Box 333.

The *Engineers and Architects' Club of Louisville* meets in the Norton Building, Fourth avenue and Jefferson street, on the second Thursday each month at 8 p. m.

The *Western Foundrymen's Association* meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. S. T. Johnston, Monadnock Block, Chicago, is secretary of the association.

The *Engineers' Club of Columbus, (O.)*, meets at 12½ North High street, on the first and third Saturdays from September to June.

The *Engineers and Architects' Association of Southern California* meets each third Wednesday of the month in the Hall of the Chamber of Commerce, Los Angeles, Cal.

The *Engineers' Society of Western New York* holds regular meetings the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.

The *Civil Engineers' Society of St. Paul* meets on the first Monday of each month, except June, July, August and September.

The *Engineers' Society of Western New York* meets on the first Monday of each month at the Society's rooms in the Buffalo Library.

Boston Society of Civil Engineers.

At the monthly meeting, held April 15, at Wesleyan Hall, Mr. Joseph R. Worcester read a paper on "Riveted Joints," after which the question of frictional resistance and the proportioning of joints was discussed.

Western Society of Engineers.

At the next regular meeting to be held at the Society's room, 1737 Monadnock Block, on May 6, a paper will be read by Mr. George E. Thomas, M. W. S. E., on "Foundations." The rooms and library are now open continuously from 8.30 a. m. to 9 p. m., except on Saturdays, when they are closed at 3 p. m.

American Society of Civil Engineers.

The Twenty-eighth Annual Convention will be held at San Francisco Cal., beginning on or about June 30. The work of arranging the details of the trip is now in progress, and a complete statement of the time required, total expense, route, etc., cannot be given at the present time. It is expected, however, that the Western trip will be arranged over one of the transcontinental lines in the United States, and the return trip from San Francisco to be made via Portland, Vancouver and the Canadian Pacific Railroad.

Western Railway Club.

At the meeting on Tuesday, April 21, a discussion on the Exhaust Jet was introduced by Mr. J. F. Deems, of the Chicago, Burlington & Quincy, who has been experimenting on the lines suggested by Professor Goss at the meeting of the club in October, 1895, and has produced some interesting results. The Committee on Lumber Loading made a short report which was followed by a topical discussion on the Pooling of Engines. The chief paper of the day was on "Locomotive Rating and Fuel," by Tracy Lyon, of the Chicago Great Western. Another paper on "Railroad Ethics," by Mr. H. D. Judson, of the Chicago, Burlington & Quincy Railroad, was to have been read.

Engineers' Club of St. Louis.

The club met April 15th, 29 members and five visitors present. Albert Borden, of the engineering department of M. S. Cartter & Co., was elected a member. Applications for membership were announced from E. R. Fish and H. C. Meinholtz. On motion it was ordered that a committee of three, of which the president be chairman, be appointed to co-operate with the local members of the American Society of Mechanical Engineers, for the entertainment of their coming convention.

Mr. Carl Gayler read a paper on "Highway Bridges." He reviewed briefly the movements in the direction of reform which had heretofore taken place, particularly the agitation of 1890, and gave his views as to why those movements had accomplished so little. He explained a typical case of highway bridge design, and described an accident to the Broadway bridge over the River Des Peres, in South St. Louis, where a contracted water way had resulted in scouring out a deeper channel, and undermining one of the abutments. He thought it proper in designing highway bridges to use lower unit strains than is customary for railroad bridges, rather than higher, as is the general practice. In general, railroad bridge practice could, in his opinion, be followed to advantage in highway work. He also discussed lateral top bracing, painting and inspection. Messrs. Eayrs, J. B. Johnson, Pitzman, Crosby, French, Russell and Baier participated in the discussion.

American Society of Mechanical Engineers.

The convention of the American Society of Mechanical Engineers will be held at St. Louis, Mo., May 19 to 22. Tickets may be purchased on the certificate plan at the rate of 1½ fare for the round trip. Arrangements have been made for special cars westward over the line of the Pennsylvania Railroad, leaving New York at 2 p. m. May 18. This train is due at Philadelphia at 4.30, at Harrisburg at 7.30, at Pittsburg at two o'clock the next morning, at Columbus at 7.15 in the morning, at Indianapolis at 2.30 and at St. Louis at 7 o'clock p. m., May 19. The headquarters of the convention and the place of meeting is the Southern Hotel. A condensed programme and list of papers follows:

Tuesday Evening.—Opening session in the Grand Parlor of the Southern Hotel at 9.00 p. m. After the close of the address, about 10 o'clock, an informal reception and conversation with refreshments will be held in the hotel parlors.

Wednesday Morning.—General business session, at which and at the Friday morning session only will any general business be in order. The Council has directed that the presentation and discussion of such business topics shall be considered as out of order at the distinctly professional sessions.

Professional papers will be taken up as follows:

Keep, Wm. J.: Strength of Cast Iron.

Kent, W.: The Efficiency of a Steam Boiler. What is it?

Eldridge, A. H.: Test of a Four Cylinder Triple Expansion Engine and Boiler.

Hale, R. S.: Determining Moisture in Coal.

Wednesday Afternoon.—An excursion by trolley cars has been arranged, covering the principal lines and most interesting parts of the city.

Wednesday Evening.—Professional papers as follows: Kettell, Chas. W.: A Study of the Proper Method of Determining the Strength of Pump Cylinders.

Goss, W. F. M.: The Effect upon Diagrams of Long Pipe Connections for Steam Engine Indicators.

Carpenter, R. C.: A New Form of Steam Calorimeter.

Hoffman, J. D.: A Hydraulic Dynamometer.

Thursday Morning.—Professional papers as follows: Henderson, Geo. R.: Spring Tables.

Whitham, Jay M.: Effect of Retarders in Fire Tubes of Steam Boilers.

Whitham, Jay M.: Experiments with Mechanical Stokers.

Thurston, R. H.: Superheated Steam.

Bryan, Wm. H.: Western River Steamers.

Topical discussions.

Thursday Afternoon.—After luncheon one of the Columbia Excursion Company's steamers will leave foot of Locust street, at 2 o'clock, to convey members and friends to the New Water Works, Chain of Rocks and other points of interest along the river front. Return after supper on the boat, arriving at 7 P. M., in time for reception.

Thursday Evening.—Reception to the society by the citizens of St. Louis in the parlors of the Southern Hotel.

Friday Morning.—Professional papers as follows: L. R. Alberger, A Self-Cooling Condenser; H. F. J. Porter, Hollow Steel Forgings; F. R. Hutton, A Classification and Catalogue System for an Engineering Library; Thos. E. Murray, A Steel Plate Flywheel.

Topical discussions.

Concluding business and adjournment.

Friday Afternoon.—Excursions under the guidance of local members. Two large parties will be made up for visits to Cupples Station and the Anheuser-Busch brewery. Other excursions in smaller parties and by individuals will be arranged as may be desirable. A boulevard run on bicycles will also be arranged if a sufficient number of visitors express a desire to participate.

In addition to the excursions which will be made by the society as a whole in large parties, the Local Committee of Arrangements have secured invitations from a number of firms, at whose works small parties will be welcomed of those specially interested. Carriages and bicycles can be had on application at the Secretary's office, at the Southern Hotel, to convey visiting ladies and their escorts to points of interest about the city.

PERSONAL.

—Mr. Alfred Attwood has been recently appointed Locomotive Superintendent of the Mexican Railroad (the Vera Cruz line). He succeeds Mr. J. G. Evans, resigned.

—Mr. C. Ironmonger, who for several years was General Eastern Agent of the Seaboard Air Line at New York City, has been appointed General Advertising Agent of that road.

—Mr. Arthur Crandall, for some time past the Manager of the sales department of the Railroad Supply Co., of Chicago, has resigned that position, and is no longer connected with the company.

—The New York *Herald* reports that Prince Chilkov, the Russian Minister of Ways and Communications, is to visit the United States next autumn. He will start from St. Petersburg in August, traveling through Siberia.

—Mr. John M. Egan, formerly President of the Chicago Great Western, has been appointed Assistant President of the Lake Superior & Ishpeming road, a new line in the Northern Peninsula of Michigan, now about completed.

—Mr. George T. Anderson, who, for the past 15 years, has been connected with the Indiana Car & Foundry Co., at Indianapolis, Ind., has been appointed Superintendent of the shops of the Chicago, New York & Boston Refrigerator Company, at Elsdon, Ill.

—Mr. Cyrus H. Jenks has been appointed Superintendent of the Montana Central, with headquarters at Great Falls, Mont. Mr. Jenks has for the past two years been Superintendent of the Northern Division of the Great Northern, with headquarters in Grand Forks, N. Dak.

—Mr. F. W. Morse, who has been for some years with the Wabash, and is now Division Master Mechanic with headquarters at Fort Wayne, Ind., has been appointed Superintendent of Motive Power of the Grand Trunk road. He succeeds Mr. Herbert Wallis, who has held that office since 1873.

—Mr. J. D. Hasbrouck, recently General Manager of the New Jersey & New York Railroad, has been appointed Superintendent of the Piermont Branch of the Erie. This line has heretofore been operated as part of the Eastern Division of the Erie.

—Mr. E. O. Hopkins, one of the recent joint receivers of the Louisville, Evansville & St. Louis road, will probably be reappointed to that office. He has been again nominated by the Bondholders' Committee, whose chief interest is in the Western Division of the road, and it is thought that he will be confirmed by the United States Court at Indianapolis in a few days.

—Mr. James W. Musson, whose resignation as Manager of the Nickel Plate Fast Freight Line was noted a few weeks ago, has been appointed General Superintendent of the Car Department of the Merchants' Despatch Line, his headquarters as such being at Rochester, N. Y. Mr. Musson's successor as Manager of the Nickel Plate Line is Mr. F. L. Pomeroy, formerly General Freight Agent of the Erie, as has already been stated.

—Professor J. M. Silliman, Professor of Mining, Engineering and Graphics of Lafayette College, at Easton, Pa., for the last 25 years, died at Easton last week after a short illness. He graduated from the Rensselaer Polytechnic Institute in 1870 and went to Lafayette in 1871, being soon made a full Professor. He was a member of the American Society of Mining Engineers and other associations and the author of many scientific papers.

—Mr. Thomas B. Purves, Jr., has been appointed Superintendent of Rolling Stock of the Boston & Albany, and will have charge of both the locomotive and car departments. His office will be at Springfield, Mass., and all reports should be made to him there.

—Mr. William H. Taft, now Acting Superintendent of Motive Power, has been appointed Superintendent of Motive Power, with office in Boston.

Mr. C. H. Barnes has been appointed Division Master Mechanic at West Springfield, Mass., and assumed the duties of the office April 21, 1896.

—Mr. William Tunkey, the engineman who ran the Lake Shore & Michigan Southern special train from Erie to Buffalo on Oct. 24, 1895, 86 miles, in 70 minutes 46 seconds, or 72.9 miles an hour, has received from the Brooks Locomotive Works, the makers of the engine No. 564, which was used on that occasion, a gold watch. The presentation speech was made by Mr. Delos Everett. Mr. Tunkey, in making a modest response, spoke of the credit due to others than himself, and mentioned especially the fireman, Mr. W. B. Stanford. Last Christmas Mr. Tunkey received a silver medal from Messrs. Vanderbilt and Webb.

—Mr. James S. Drake, General Superintendent of the New Jersey & New York Railroad, died at his home at Hillsdale, N. J., on April 16. The immediate cause of his death was pneumonia, resulting from a cold contracted on Sunday of last week. A few days before that Mr. Drake had undergone a surgical operation. He has been away from his office through ill health since last winter. Mr. Drake's first railroad work was as apprentice and shop foreman on the Grand Trunk 40 years ago. He was afterward Master Mechanic of the Portland & Rochester road in Maine. About 1877 he went to New York as Master Mechanic of the New York Elevated Railroad, and two years later went to the New Jersey & New York as Master Mechanic. In 1880 he was appointed Superintendent as well, and in recent years gave all his time to the latter office.

—Mr. Herbert Wallis, Mechanical Superintendent of the Grand Trunk, is to retire from that position after a service of about 25 years with that company. For all this time, except the first two years, he has been at the head of the mechanical department. He received his early mechanical training on the Midland Railway of England, entering its shops at Derby, as a pupil of Matthew Kirtley, then Locomotive Superintendent. After service in the drafting room, and the workshops there he became in 1866 Foreman of the locomotive and carriage department in the shops at Bradford. In 1871 he was offered the post of Assistant Mechanical Superintendent of the Grand Trunk by the President of the company and sailed for Montreal in May of that year. In January, 1873, he was promoted to be Chief Mechanical Superintendent. Mr. Wallis has all those qualities which make Englishmen of his class recognized everywhere as excellent examples of robust and fine manhood. He was recently elected President of the Canadian Society of Civil Engineers and he is also a member of the Institution of Civil Engineers and of the Institution of Mechanical Engineers of England. Because of the Canadian tariff laws the Grand Trunk builds all the equipment for its Canadian lines and manufactures a large class of articles in its shops which railroads in this country purchase from private manufacturer. This policy requires, of course, a very thorough mechanical knowledge and high administrative talent at the head of its mechanical department, two points in which Mr. Wallis is very well equipped. A local paper publishes statistics regarding the equipment of the Grand Trunk which give a very fair idea of the important work of the mechanical department. Since Mr. Wallis has been Mechanical Superintendent the road's locomotive equipment has grown from 353 to 898 engines, its passenger cars from 352 to 916, and its freight car equipment from 6,078 cars to 23,383 cars. Since the high tariff policy was adopted in Canada about 240 locomotives have been built in the Montreal shops of the company, and only 10 engines have been built during that time for the Canadian lines outside of the company's shops. It is said that the cost has averaged about \$2,000 less for each engine built than if the engines had been built in the United States. In addition to the locomotives, some thousands of new cars of all classes have been built at the company's shops.

ELECTIONS AND APPOINTMENTS.

Erie—S. P. Shane, lately General Freight Agent at Cleveland, has been appointed Assistant General Freight Traffic Manager of the Erie, and also of the Chicago & Erie. As already announced George B. Whittlesey, Chief Clerk in Mr. Shane's office, has been promoted to be the Assistant General Agent of the Erie. The offices of both are to remain in Cleveland.

Georgia Midland.—R. A. Lancaster, President of the road, which is the successor to the Georgia, Midland & Gulf, announces the following appointments: C. W. Cheers, General Manager; T. S. C. Howard, Auditor and Treasurer, Columbus, Ga.; N. D. Lancaster, Secretary, New York; Clifton Jones, General Freight and Passenger Agent, Columbus, Ga.

Grand Trunk.—John Pullen has been appointed Division Freight Agent with headquarters at Stratford, Ont. His division will extend from Carlton to Point Edward and all lines north thereof, excepting the territory north of Georgetown. Mr. Pullen has been Agent of the Reading Dispatch at Chicago for five years.

Macon & Birmingham.—George M. Duke, bookkeeper in the auditing department of the Memphis & Charleston, at Memphis, has been appointed Auditor of the Macon & Birmingham Railroad, with headquarters at Macon, Ga.

Michigan, Ohio & Southern.—The Directors and officers of this new Ohio Company are: Directors: Marcus Pollasky, Lester O. Goddard and James T. Hall, Chicago; Harry A. Conant and William F. Jarvis, Detroit; D. J. Coble and W. L. Parmenter, Lima; Edward P. Hooker, Defiance, and G. A. Garretson, Cleveland. Marcus Pollasky, President; Lester O. Goddard, Vice-President; James T. Hall, Treasurer, and D. J. Coble, Secretary; C. J. Williams, of Cleveland, Chief Engineer, and Gen. William Sooy Smith, of Chicago, Consulting Engineer.

Ohio Southern.—The stockholders at their meeting at Springfield, O., on April 12, elected as Directors D. O'Dell, S. D. Beyer, E. L. Oppenheim, Archibald Smith, E. R. Thomas, New York; J. B. Townsend, C. H. Roser, W. B. Ritchie, Lima, O., and H. L. Chapman.

New York Central & Hudson River.—The annual meeting of the stockholders was held in Albany, April 15, and the Board of Directors was re-elected as follows: Cornelius Vanderbilt, Chauncey M. Depew, Charles C. Clarke, Horace J. Hayden, William K. Vanderbilt, Frederick W. Vanderbilt, Samuel F. Barger, J. Pierpont Morgan, Samuel D. Babcock, of New York; William Bliss, Boston; Sherman S. Jewett, Buffalo, N. Y.; Erastus Corning, Albany; George C. Buell, Rochester, N. Y.

West Shore.—The following directors were re-elected at the annual meeting last week: Cornelius Vanderbilt, William K. Vanderbilt, Frederick W. Vanderbilt,

Chauncey M. Depew, Ashbel Green, J. Pierpont Morgan, Charles C. Clarke, Edward D. Adams, Horace J. Hayden, Samuel F. Barger, Charles Lanier, James D. Layng and Charles H. Coster.

RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

American.—This is the title adopted for the latest of the Populist railroad projects which have come to light in Iowa. The charter of course provides for a very ambitious line, the route named being, in this instance, from Chicago to Council Bluffs, between which there are now five railroads competing for the business. The Directors named are James F. Greene, J. M. Gass and others of Des Moines, Ia.

Ann Arbor.—A good deal of work is now being carried on by this railroad, continuing the policy begun a year or two ago of reducing grades and building short connecting lines on various parts of the road. At Toledo, where important new terminals are being built, the rails have now been laid on the new line to Cherry street, where the new station building of the company is being erected. At Whitney, O., where a new line is being built to shorten the distance by the present line, several steam shovels are employed and a large force of men, and the work is being pushed rapidly. At a number of other points along the line work of a similar nature is going on.

Arkansas City, Blackwell & Southern.—This company was incorporated in Kansas last week, to build a road from Arkansas City, in Southern Kansas, south of Wichita, into Oklahoma, to Blackwell, about 20 miles south of the Kansas line. The directors are J. B. Tucker, Charles Day, Blackwell, Okla.; A. J. Seay, William Grimes, Kingfisher, Okla.; T. W. Eckert, George S. Hartley, A. A. Newman, Howard Ross, C. L. B. Brown, S. T. Alton, Arkansas City.

Bellefonte Central.—The company will begin laying track next week on its seven-mile extension to Pine Grove Mills, Pa., and the work will be completed in about a month. It is then contemplated to make a further extension of about 20 miles through the northern section of Huntingdon County to a connection with the Huntingdon & Broad Top Road at Huntingdon. This new line will reach a section not now reached by any railroad.

Cairo & Tennessee River.—The charter of this company was recorded by the Secretary of State at Nashville, Tenn., this week. It provides for the construction of a road beginning at Bristol, in Sullivan County, and running westwardly through the counties of Hawkins, Hancock, Claiborne, Union, Campbell and Scott, and entering the State of Kentucky, near the state line between Campbell and Scott Counties, and thence through that state to Fort Jefferson and the Mississippi River. The incorporators are J. M. Coulter, A. J. Harpole, of Tennessee; B. A. Neale, W. W. Robinson, E. S. Beaumont and others.

Chicago, Hammond & Western.—Articles of incorporation of the railroad were filed with the Secretary of State at Springfield, Ill., this week. It is proposed to build a road from Blue Island, Ill., to a point in Dupage County, to connect with the Chicago, Milwaukee & St. Paul.

Cincinnati & Jackson.—Tracklaying on this road, building between Addison and Jackson, Mich., has been completed and the first passenger train was run into the latter city on Wednesday of last week. The new road is about 18 miles long and is an extension of the Cincinnati, Jackson & Mackinaw from its present terminus at Addison. The ballasting on the new road has yet to be done.

Gray's Harbor & Northern.—This company has been recently organized at Aberdeen, Wash., with H. C. Heermans, George H. Emerson and C. A. Congdon as incorporators. It is proposed to build from Aberdeen to Hoquiam, 10 miles, at once, and money has been raised for that purpose. From Hoquiam a line will be built into the peninsula north of Gray's Harbor, on the Pacific Coast, later on.

Great Neck & Port Washington.—This company was incorporated at Albany, N. Y., last week, to build a road from a point on the Long Island road at Great Neck, Queens County, to Port Washington, a distance of four miles. The directors include Austin Corbin, President of the Long Island, E. R. Reynolds, General Manager, and other officers of that company.

Gulf & Ship Island.—The rebuilding of the southern division of the line has now been practically completed for 25 miles north of Gulfport, Miss., and regular trains have again been put on this division, the present terminus of the operated road being at McHenry, Miss. South of Gulfport track has been laid through the town to the wharves, and it is proposed to extend this track into the bay to reach deep water.

Jamestown & Lake Erie.—Brady Brothers, of Bayonne City, N. J., who have the contract for grading the extension of this road from Jamestown to Falconer, N. Y., four miles, are to complete their work by Sept. 1. They have already put a large force of men at work near Jamestown, the present southern terminus of the road, and three steam shovels have been placed in operation. The grading, as has been stated, is quite heavy. The extension of the road to Falconer will give it a connection with the Dunkirk, Allegheny Valley & Pittsburgh and through that road with the New York Central & Hudson River and the Lake Shore & Michigan Southern which cross it at its northern terminus at Dunkirk, N. Y.

Jefferson Coal & Railway.—This company was incorporated in Alabama last week with a capital stock of \$400,000. It has been organized by the purchasers of the property of the Mary Lee Coal & Railway Company, of Birmingham, Ala., which was sold some months ago under a decree issued in a suit brought by the Maryland Trust Co., of Baltimore, trustees for the bondholders. The purchasers at that sale were James Sloan, Jr., Douglas H. Gordon and Joseph W. Jenkins, of Baltimore. Besides the coal and mining interests of the company at and near Birmingham, which will be taken over by the new company, the sale includes also the transfer of about seven miles of railroad built out of Birmingham.

Michigan, Ohio & Southern.—This company has succeeded to the franchises and property of the Columbus, Lima & Milwaukee road, owning a graded roadbed out of Columbus, north to Defiance, O. The following directors of the new company have been elected: Marcus Pollasky, Lester O. Goddard and James T. Hall, of Chicago; Harry A. Conant and William F. Jarvis, of Detroit; D. J. Cable and W. L. Parmenter, of Lima; Edward P. Hooker, of Defiance, and G. A. Garretson, of Cleveland. The new company will absorb all the interests and property of the West Virginia, Ohio & Western;

Columbus, Lima & Milwaukee, Detroit & Toledo Short Line, Central Michigan, Michigan & Ohio Belt Line and other short roads in Michigan and Ohio, to form a route from the coal fields of Ohio with the lakes. Work will be commenced at once, it is said. C. J. Williams, of Cleveland, has been elected Chief Engineer.

Ohio River & Charleston.—President Samuel Hunt and Superintendent A. Tripp, of this road, last week went over the entire line, and announce that the roadbed, trestles and bridges are to be greatly improved during the year. The bridges will be replaced by heavier structures, and considerable trestle work will be filled in.

Olympic Peninsula.—Articles of incorporation were filed in Washington State last week by William E. Hagan, John W. Corson and Calvin A. Hagan. The company proposes to build a railroad line from some point on the Straits of Fuca, near Clallam, southerly along the coast west of the Olympic Mountains to Gray's Harbor, which is the terminus of a branch of the Northern Pacific.

Philadelphia & Reading.—A second track is to be built on the Plymouth branch, nine miles, and a number of curves in the present line will be eliminated. These improvements are made to facilitate the company's through freight business between the anthracite region and New York, by providing a route from the main line in the Schuylkill Valley at Norristown, by way of Conshohocken, across to the North Pennsylvania road, where it reaches the New York division. This will relieve the tracks and the yards near Philadelphia, and do for the Philadelphia & Reading what was done for the Pennsylvania by the "Trenton cut-off."

Pittsburgh, Lisbon & Western.—This company was incorporated in Ohio last week by the purchasers of the Pittsburgh, Marion & Chicago, at the recent sheriff's sale at Lisbon, O. That road, as has been stated, is about 25 miles long, extending from New Galilee, Pa., to New Lisbon, O. The ownership of the road is practically unchanged, the chief interests being still represented by Gurnee & Co., of New York City.

Prince Edward Island.—The Commissioner of Railways of Canada has prepared resolutions to be introduced in the Dominion Parliament, authorizing the construction of the following branches of this road: From Southport to Murray Harbor South, with a cross line connecting with the Prince Edward Island between Peakes and Cardigan Station; from Souris or Harmony Station to Elmira; from a point between Royalty Junction and York Stations to Cove Head, and thence to Oyster Bed Bridge; from Emerald Junction to Stanley Bridge, touching at or near Clifton; from Summerside to Richmond Bay; from South Point at or near O'Leary's Station to some point on the western coast between Brae and Cape Wolfe; from Wiltshire to Victoria.

Rio Grande Western.—The work of tracklaying on the extension of the Sevier Valley branch has been completed for six miles south of Salina, Utah. The company is having difficulty in obtaining men at \$2 per day for track labor. This is hindering the progress of the extension more than any other cause. The rails will be laid into Richfield, 30 miles, by the middle of next month.

Sebastian & Cincinnati.—The preliminary survey for this road has recently been completed by J. O. Fries, of Orlando, Fla., and W. H. Lancaster, formerly on the Baltimore & Ohio Southwestern, who will have charge of the construction of the road. The road which it is proposed to build will be about 10 miles long from Sebastian station in Southern Florida on the extension of the Florida East Coast line, below Melbourne, west through Brevard County, to a new settlement called Cincinnati. The chief projector of the railroad is A. O. Russell.

Southwestern.—Dr. W. Steward Webb, President of the St. Lawrence & Adirondack, went over the new branch building to Caughnawaga to connect with the Adirondack road at Valleyfield, Que., last week, and stated that he expected to have the new road ready for traffic by June 15.

Southwestern Arkansas & Indian Territory.—Receiver J. A. Woodson has been authorized to extend the road from its present terminus at Antioch, Ark., to Pike City, a distance of 12 miles. To meet this expense, receivers' certificates, not to exceed \$20,000, bearing interest at eight per cent., will be issued.

Electric Railroad Construction.

Baltimore, Md.—The Traction Co. is making several improvements in its system. The Druid Hill avenue road, which has about ten miles of track, will be changed from cable to electric power. This is the only portion of the company's lines which is run by cable, although it still has a number of miles of horse car lines. The Shore Line Railroad, which the Traction Co. will operate under lease, will be finished about the middle of May, and transfers will be given between it and the rest of the Traction Co.'s lines.

Brooklyn, N. Y.—The Nassau Railroad Co. has begun its eighty-sixth street extension to Bensonhurst, on New York Bay. This will give a route from New York to Bensonhurst by way of Hamilton Ferry, by which it is said better time may be made than by the present route by the Thirty-ninth Street Ferry. The car fare will be only five cents.

Chattanooga, Tenn.—The City Council has voted to grant a franchise to S. W. Divine and others for an electric railroad.

Chicago.—Articles of incorporation were filed last week by the Terminal Railroad Co., which is formed by F. S. Winston, J. F. Meagher, F. R. Babcock and others.

Elgin, Ill.—The Elgin City Railway Co. has let the contract for building the road from Elgin to Geneva, a distance of 13 miles, to the Yawger Construction Co., of Bucyrus, O.

Hamilton, Ont.—The Radial Railway Co. will begin work at once on the Beach Line. Engineer Hillman has charge of construction, and it is said the contract has been given to W. P. Chapman.

B. B. Osler, owner of the Hamilton & Dundas Street Railway, is making arrangements to have the motive power changed from steam to electricity.

Hastings, Fla.—Press reports say that William L. Door and William A. Evans will build an electric road from Hastings to Federal Point and that the power will be generated by an artesian well. The proposed road would be about eight miles long.

Lewiston, Me.—Articles of association have been filed for the Lewiston & Brunswick Street Railway. It is proposed to build the road from Lewiston to Brunswick, 21 miles, passing through Lisbon and Topsham. The

capital stock is \$200,000, and among the directors are Norton Q. Pope, Poland, Me., and Frank W. Dana, Lewiston.

Lewiston, N. Y.—The contract for the construction of the Lewiston & Youngstown Frontier Electric Railroad has been let to Cragg & Trench, of 139 Main street, Buffalo, and the contracts for rails, ties, crushed stone, poles and overhead work will be let at once. As soon as the material is on the ground a large force of men will be put to work and the work will be done with all possible speed. The new road is an extension along the river bank of the Gorge Road from Niagara Falls to Lewiston, which was also built by the same company, and when the new road is finished there will be an electric road between Lake Erie and Lake Ontario.

Milwaukee, Wis.—It is announced that the Milwaukee & Wauwatosa Motor Railway has been sold to an Eastern syndicate for \$150,000, and that the road will be extended and equipped with electricity. The company owns about 12 miles of track operated by steam.

New Haven, Conn.—The New Haven Street Railway Co. has decided to extend its lines to Centerville, a distance of about three miles, paralleling the Northampton division of the New Haven Railroad. The extension will be completed in a few weeks.

An arrangement has been made by the Middletown Street Railroad Co. for crossing the new Connecticut River bridge, which is to be opened to-day at that city. The road is to be pushed northward rapidly through Portland, and will ultimately compete to some extent with the New England road and the Valley division of the New Haven road.

Newton, Mass.—The Newton Street Railway Co. will extend its road from the present terminus at Waltham to Bemis and will make other improvements.

The West End Co. will extend its Oak Square line from the present terminus in Brighton to Newton, passing through Tremont, Park and Washington streets.

Norfolk, Va.—The City Council has granted permission to the Norfolk Electric Street Railway Co. to extend its road to Brambleton and to make several extensions in Norfolk. The company will enlarge its plant, and improve its service generally during the summer.

The Port Norfolk Electric Street Railroad has secured permission to lay its tracks on certain streets of Portsmouth, at an annual rental of \$20 per car. Work will be begun in 60 days.

Oregon, Mo.—The Oregon & Forest City Electric Railway Co. has been incorporated with a capital stock of \$60,000 by J. E. Cummins and R. C. Brenton, of Oregon, and F. C. Oakley, of Wyandotte Kan. The company is said to be ready to place a contract for the entire equipment, including the power-house. The road will be nearly four miles long. J. E. Cummins is Secretary.

Red Bank, N. J.—The Board of Commissioners has granted a franchise to the Red Bank & Long Branch Electric Railroad Co., for a road in the business part of Red Bank. The company is required to macadamize and keep in repair the streets through which the road will be built. The company is also to make a deposit of \$10,000.

Rutherford, N. J.—The Union Traction Co. applied last Monday for a franchise in East Rutherford, it wishing to have its road extend from Carlstadt through East Rutherford to connect with the Newark electric roads at Arlington or Belleville.

South Hadley, Mass.—The Holyoke Street Railroad, which has a line across the bridge over the Connecticut River, between Holyoke and South Hadley Falls, has received authority from the town of South Hadley to extend its line northward about three miles to Mt. Holyoke College, and the construction of the new track will be begun at once.

Toledo, O.—The Toledo, Bowling Green & Tremont Railway Co. was incorporated April 16, with a capital stock of \$500,000. Some of the incorporators are Parks Foster, of Elyria, O.; Thomas H. Walbridge, George W. Barnes, James A. Huston and Robinson Locke, of Bowling Green, O.; W. H. Millikin, of Bowling Green, O. The company expects to have its road in operation as far as Bowling Green by the 4th day of July. The extension from Bowling Green to Fremont will also probably be made this season.

Troy, N. Y.—The Troy City Railway Co. has begun its Oakwood avenue extension, and it is expected to have it completed in a month. Work has also been begun on the loop from Congress street on Third and Fourth streets.

Worcester, Mass.—The Worcester & Marlboro Street Railway Co. has been formed for building an electric road from Worcester to Marlboro, passing through Shrewsbury and Northboro, a distance of 15 miles. The company also proposes to build a branch from Westboro to connect with the main line at Northboro. Some of the directors are Otis E. Putnam and John C. McInnes, Worcester; W. A. Tucker and Arthur D. McClellan, Boston.

GENERAL RAILROAD NEWS.

Chicago & Northern Pacific.—A compromise has been effected between the reorganization committees of the Northern Pacific and this road, which will remove the obstacles to a foreclosure and reorganization of this company. The Northern Pacific committee will discontinue all legal proceedings against the Chicago & Northern Pacific, and the reorganization of the latter will pay \$1,500,000 for certain Chicago & Calumet terminal securities, and receive also the \$2,500,000 of Chicago & Northern Pacific bonds, the right of ownership of which has been in dispute. The agreement requires the assent of 70 per cent. of the bondholders of this company, which has been practically secured. Reorganization and foreclosure will now be rapidly advanced.

Chicago & West Michigan.—A circular issued by Charles Merriam, Treasurer of this company and the Chicago & North Michigan, informs the bondholders that, by order of the directors, only half of each interest coupon maturing May 1 and June 1, respectively, will be paid in cash. Continued dullness of business in Michigan is stated as the reason for this step. Coupon holders are offered one-half of the amount of their coupons in cash and the other half in scrip, payable ten years from date, with interest at 5 per cent. a year.

Florida Midland.—The purchase of this road by M. E. Bishop, of Orlando, Fla., for \$25,000 has been confirmed by the United States Courts. The road extends from Longwood to Kissimmee, a distance of 40 miles, making connections with the South Florida road at both points. Mr. Bishop bought the road under foreclosure. The physical condition of the road is poor and many improvements must be made.

Galveston, Houston & Henderson.—Frederic P. Olcott, of New York, recently elected President of the road, and George Gould and H. C. Rouse, of the Executive Committee, will shortly meet in New York to agree upon a reorganization of the company, to be alike satisfactory to the International & Great Northern and the Missouri, Kansas & Texas in their joint operations of the road.

Grand Trunk.—The company reports the following as February earnings:

	1896.	1895.	1894.
Gross earn.	\$1,178,433	\$1,099,458	\$1,176,831
Oper. exp.	1,025,466	951,387	1,038,556
Net earn.	\$152,967	\$148,071	\$138,275
P. c. op. exp. to gross.	87	86 1/2	88 1/2

CHICAGO & GRAND TRUNK:

Gross earn.	\$217,349	\$182,059	\$198,207
Net earn.	13,976	1,139	443

DETROIT, GRAND HAVEN & MILWAUKEE:

Gross earn.	\$69,749	\$60,496	\$66,653
Deficit.	3,675	Sur. 530	Sur. 2,317

Great Northern.—The report of earnings for the half-year ended December 31 makes the following comparison with other years:

	1895.	1894.	1893.
Gross earn.	\$11,639,227	\$9,857,841	\$9,197,040
Oper. exp.	5,675,876	5,012,745	4,579,930
Net earn.	\$5,963,351	\$4,845,096	\$4,617,110
P. C. exp. to earn.	48 1/2	50 1/2	49 1/2
Int. and guar. divs.	3,253,742	3,112,133	3,155,418
Balance.	2,709,699	1,762,963	1,461,692
Div. pr. stock.	625,000	625,000	562,500
Surplus.	\$2,084,699	\$1,137,963	\$899,192

Oregon Short Line & Utah Northern.—The Reorganization Committee announces that it has received, under the plan of reorganization, the following securities: \$10,492,000 consolidated mortgage 5 per cent. bonds of this company, being 97 per cent.; \$1,431,000 Utah Southern general mortgage bonds, being 93 per cent.; \$1,763,000 Utah Southern Extension first mortgage bonds, being 90 per cent., and \$24,550,000 of the capital stock of the Oregon Short Line & Utah Northern, being 93 per cent. In addition \$12,749,500 collateral trust 5 per cent. bonds of the Oregon Short Line & Utah Northern being 98 per cent., have assented to the plan. The committee announces that after May 1 securities will be subject to the payment of penalties of \$50 upon each bond and \$1 on each share of stock.

Union Pacific.—The reports of earnings for February show small increases in gross earnings but reduced expenses, so that the increase is not, in some divisions, quite large. The comparisons follow:

UNION PACIFIC PROPER.

Month of February:	1896.	1895.	Increase.
Gross earn.	\$925,467	\$940,343	\$14,876
Net earn.	310,211	296,898	13,313
Since Jan. 1:			
Gross earn.	\$1,862,795	\$1,910,863	\$48,067
Net earn.	528,352	592,433	64,081

OREGON SHORT LINE & UTAH NORTHERN.

February:			
Gross earn.	\$393,582	\$306,862	\$86,720
Net earn.	170,681	72,604	98,076
Since Jan. 1:			
Gross earn.	\$750,282	\$637,325	\$112,957
Net earn.	323,387	136,390	186,996

TOTAL OF UNION PACIFIC SYSTEM.

February:			
Gross earn.	\$1,508,077	\$1,433,872	\$74,204
Net earn.	524,947	392,838	132,108
Since Jan. 1:			
Gross earn.	\$3,062,678	\$2,937,995	\$124,683
Net earn.	948,216	779,357	168,859

West Jersey & Seashore.—Special meetings of the West Jersey, Alloway & Quinton, West Jersey & Atlantic, Chelsea Branch, Philadelphia, Marlton & Medford and Camden & Atlantic Railroads have been called for Saturday, May 2, to vote on the joint agreement of consolidation and merger of those lines into one company under the above name. The boards of directors of these various companies have already taken action and agreed to consolidate.

Wheeling & Lake Erie.—The company makes the following statement for the six months ended Dec. 31, being the first half of the fiscal year:

	1895.	1894.	Inc. or Dec.
Gross earn.	\$788,477	\$720,327	I. \$68,150
Oper. exp.	533,002	551,595	D. 18,593
Net earn.	\$255,475	\$168,732	I. \$86,743
Fixed charges.	184,700	184,700	—
Surplus.	\$70,774	Def. \$15,879	I. \$86,653

Kinderhook & Hudson.—Notice of a change in the name of the company was filed in the office of the Secretary of State, at Albany, N. Y., but it appears to be only the dropping of the company after Railway, as part of the legal title. The road is 18 miles long from Hudson, N. Y., to Niverville, connecting with the Boston & Albany at both points.

Electric Railroad News.

Chicago.—Mayor Swift has vetoed the ordinance granting a franchise to the Chicago Central Electric Railroad Co. The company proposed to build an overhead trolley road, on Jackson street to Michigan avenue, crossing the Jackson street bridge. This is one of the principal east and west streets in the business district and the only one on which no street car tracks are laid.

Meriden, Miss.—The electric road has been opened for traffic, though the eastern portion of the road is not yet completed. The contract for the road and 100 arc lights was let last October to W. R. Hall, of Chattanooga, Tenn. The road is about two miles long.

New Haven, Conn.—Judge Prentiss has granted a motion for foreclosure sale under the first mortgage of the Waterbury, Meriden & Connecticut River Railway.

St. Thomas, Ont.—Col. John Stacy has bought the St. Thomas Street Railroad and it is said will change it to an electric road. The road is about two miles long and is operated by horses.

San Francisco, Cal.—The San Francisco & San Mateo Railroad, the first electric road in San Francisco, have been sold at foreclosure for unpaid interest on the \$1,100,000 bonds, which are held by the California Title Insurance & Trust Co. The road, which has about 27 miles of track, was bought by Buck & Ohlandt for \$300,000.

Scranton, Pa.—The Valley Passenger Railway Co. has filed notice of a proposed abandonment of portions of its road extending through ten boroughs and three townships in the neighborhood of Scranton.

TRAFFIC.

Traffic Notes.

The Erie Canal will be opened on May 1.

At South Chicago last week the new steel barge Martha was loaded with 165,000 bushels of corn (4,620 tons), said to be the largest cargo of grain ever loaded on Lake Michigan.

Chief Justice Fuller has announced in the Supreme Court that the Nebraska maximum freight-rate cases, which were argued before the court some weeks ago, will be assigned anew to the docket for reargument.

The Dominion Coal Company, of Cape Breton, has chartered 10 large first-class schooners which will carry coal to Portland, Me., this season. About 60,000 tons for the Grand Trunk, the Maine Central and the Boston & Maine railroads has already been engaged.

A press despatch from Galveston says that the merchants there are much disturbed over the announcement that the Missouri Pacific has published a tariff on grain to New Orleans considerably lower than the rates from the same points to Galveston, which is said to be entirely at variance with the decision recently made by arbitrators Faithorn and Howe. A Galvestonian who complained to an officer of one of the roads leading to that city was told that Galveston had not carried out her promises to furnish import traffic to load the grain cars northward.

The Nassau Electric Street Railroad now carries passengers from any part of Brooklyn to Coney Island for five cents. A car by this line has made the trip, about 19 miles, in 40 minutes, a speed which promises to attract considerable patronage, and the Brooklyn Elevated road, to meet this competition, has announced a fare of 10 cents from its terminus at the Brooklyn end of the East River bridge to West Brighton Beach. (Last year the elevated trains ran to Manhattan Beach instead of to West Brighton; both are included in the limits of Coney Island.) The elevated trains run over the track of the Prospect Park & Coney Island road from Fifth avenue and Thirty-sixth street, Brooklyn. The fare by the elevated trains last season was 15 cents one way and 25 cents for a round trip.

After numerous adjournments the suit brought at the request of the Interstate Commerce Commission to test the legality of the Joint Traffic Agreement, came up for argument before Judge Wheeler, in the United States Circuit Court, in New York, April 21. The Government was represented by United States District Attorney Macfarlane. James C. Carter and L. C. Ledyard appeared as representatives of the Joint Traffic Association. Ex-Judge Ashbel Green and the Hon. Edward J. Phelps represented the Vanderbilt interests; ex-Senator George F. Edmunds, E. Randolph Robinson and Judge James A. Logan appeared for the Pennsylvania; Charles B. Alexander for the Lehigh Valley; S. E. Williamson for the New York, Chicago & St. Louis; E. W. Meddaugh, of Detroit, for the Grand Trunk, and George Green, of Buffalo, for the Erie. Mr. Macfarlane spoke for the Government and the first speakers for the defense were Messrs. Phelps and Carter. The arguments are unfinished as we go to press.

The Joint Traffic Association.

The Board of Managers has suspended the rules to allow the Grand Trunk to meet the competition of the Canadian Pacific on traffic originating in and terminating at points in Canada and passing to or from or through Toronto. The privilege does not extend to import traffic, on which a special concession was recently made, nor to the traffic competed for by the Michigan Central west of the Trunk Line limits.

The Board of Managers of the Joint Traffic Association have ruled that in making excursion fares on the basis of a certain percentage of the regular fares the same proportionate differences shall be made in favor of the differential lines as is made on regular fares over the same lines. A ruling has also been made on theatrical baggage. All the usual properties, scenery, etc., including live animals, may be included in the regular allowance of 150 lbs. per passenger. For 25 or more persons a baggage car will be allowed without charge; for 60 persons two cars, for 100 three cars, and for 150 four cars.

Southwestern Traffic Association.

The new agreement of the Southwestern Traffic Association, which we briefly noticed some time ago, has now become operative and the Association once more takes its place as an influential traffic power.

The new agreement has control of all interstate freight traffic originating in or destined to Texas, except coal and coke, and has also temporary jurisdiction over California-Texas rates pending the completion of the organization of the Transcontinental Association. The preamble says: "The members of this association join in this agreement for the purpose of promoting harmony and co-operation between its members in the advancement of the material interests, and fostering the industries, of the communities which they serve, by first, jointly establishing and uniformly maintaining rates of charge for their respective services, which shall not be unreasonable or unjust; second, by observing and furthering the observance of the Interstate Commerce law and all other statutes relating to or affecting the interstate freight traffic hereinafter described."

The membership of the association comprises the Southern Pacific, Rock Island, Santa Fe and Gould systems, the St. Louis Southwestern, the Missouri, Kansas & Texas, St. Louis & San Francisco, Kansas City, Fort Scott & Memphis, New York & Texas Steamship Company and the Cromwell Steamship Company. The governing power is vested in the Executive Board, consisting of the presidents of the companies; a Board of Administration composed of one member from each system or interest represented, and a Chairman.

The Board of Administration is to be in continuous session, the members to have absolute control of rates and agencies for their respective interests, subject only to action taken by the Boards of Directors of the various companies. It shall require a four-fifths vote of the Board of Administration to adopt any proposition and a unanimous vote on all questions involving an apportionment of traffic. In case of dissatisfaction with the acts of the Board of Administration each member shall have the right to appeal to the Executive Board, whose conclusions in all matters shall be final. It will be seen that the new Association patterns closely after the Joint Traffic Association.

The Board of Administration has the power to decide whether any member has violated the agreement, and if

so, to fix such penalty as it sees fit; in case a cash penalty is imposed the maximum amount for any one violation is not to exceed \$5,000.

The Board as at present announced is as follows:

H. C. Wicker, Santa Fe System and the St. Louis & San Francisco Railway Company.
W. S. Speirs, Rock Island System.
A. S. Dodge, Gould System.
J. Waldo, Southern Pacific System.
C. Haile, Missouri, Kansas & Texas Railway Company.

J. B. Bartholomew, New York & Texas Steamship Company.

The headquarters of the Association are at St. Louis, and the Board of Administration has appointed L. F. Day Chairman. The agreement is to continue in force until Dec. 31, 1896, and thereafter until ninety days' written notice of withdrawal by one or more companies has been given.

Chicago Traffic Matters.

CHICAGO, April 15, 1896.

About forty dressed beef shippers and officers and agents of the eastbound lines have been summoned to appear before the Federal Grand Jury in Chicago, May 4. It cannot be learned definitely what the government intends to investigate. It is said, however, on good authority, that the railroad men have been subpoenaed to testify in behalf of the United States against the alleged dressed beef trust.

The executive officers of the Western roads have agreed not to restore the ten-ride party rates in the territory west of Chicago and east of the Missouri River, except in the territory competitive with the Central Passenger Committee, which means in the State of Illinois.

The executive officers of the Western roads have resolved to restrict the use of 2,000 mile tickets to original and bona fide purchasers, and circulars to this effect have been issued. These books are sold for \$50 each, with a \$10 rebate for the covers. Hereafter these covers will be redeemed by Chairman Caldwell, of the Western Passenger Association, instead of by the individual roads, which it is thought will head off the scalpers.

Chairman Caldwell, of the Western Passenger Association, has ruled that for each special train one baggage car may be hauled free, but for each additional baggage car a charge of 25 cents a mile must be made, with a minimum of \$15.

A contract has been entered into between the Elgin, Joliet & Eastern and the Chicago & Western Indiana and Belt line, which gives the former complete trackage rights over the latter in Chicago. This will enable it to run its freight trains to all Belt junctions in and around Chicago. The contract runs from March, 1896, to Oct. 1, 1897.

The Chicago Eastbound Committee has referred the question of export rates via St. Johns, N. B., to the Joint Traffic Association with the recommendation that the rates be made 110 per cent. of the Boston rate. The same committee has refused to recommend any lower export rate via Halifax.

For the Christian Endeavor Convention at Washington, D. C., July 7-13, the Western roads have agreed to one fare for the round trip. East of the Missouri River the tickets will have a 14-day limit, and west of the river 16 days.

The new transcontinental freight rates will not go into effect May 1, as was anticipated. There are some differences between two or three of the lines that will have to be settled before the tariffs go into effect, which may not be before June 1, if then.

The gossips allege that the Grand Trunk is a rate cutter on dressed beef and live stock from Chicago. This road normally has about 12 1/2 per cent. of the total eastbound traffic, but it is said to be now 50,000 tons ahead of its allowance. Last week it carried 24 per cent. of the dressed beef and live stock business out of this city, which, its competitors think, could not have been done except by a manipulation of tariffs. The proportions of the live stock and dressed beef business carried by the different lines for the week ending April 14 (last figures) and from April 1 to 14 were:

Roads.	WEEK TO APRIL 14.		APRIL 1 TO 14.	
	Tons.	p. c.	Tons.	p. c.
Baltimore & Ohio.....	1,540	4.8	3,068	5.3
C. & C., C. & St. Louis.....	633	2.0	794	1.4
Erie.....	3,117	9.8	5,872	10.1
Grand Trunk.....	7,715	24.3	14,351	24.8
Lake Shore & Mich. Sou.....	5,869	18.5	9,767	16.9
Michigan Central.....	4,630	14.6	9,172	15.9
New York, Chi. & St. Louis.....	2,285	7.2	3,924	6.8
Pitts., Cin. Chi. & St. Louis.....	2,406	7.6	4,325	7.5
Pitts., Ft. Wayne & Chi.....	2,020	6.4	3,844	6.6
Wabash.....	1,534	4.8	2,723	4.7
Totals.....	31,755	100.0	57,840	100.0

Eastbound rates in general continue to be well maintained, but, owing to the opening of navigation, last week's business shows a marked decrease. The total shipments of freight, not including live stock, by all lines, for the week ending April 18, amounted to 61,690, compared with 65,993 tons for the preceding week, a decrease of 4,303 tons, and against 61,904 tons for the corresponding week of last year. The proportions carried by each road were:

Roads.	WEEK TO APRIL 18.		WEEK TO APRIL 11.	
	Tons.	p. c.	Tons.	p. c.
Michigan Central.....	5,576	9.0	5,981	9.1
Wabash.....	5,131	8.3	5,760	8.8
Lake Shore & Mich. South.....	8,568	14.1	9,221	13.8
Pitts., Ft. Wayne & Chicago.....	9,263	14.9	6,977	10.6
Pitts., Cin. Chi. & St. Louis.....	6,558	10.6	8,131	12.4
Baltimore & Ohio.....	4,866	7.8	5,777	8.8
Chicago & Grand Trunk.....	7,504	12.2	8,361	12.7
New York, Chi. & St. Louis.....	4,988	8.1	5,951	9.0
Erie.....	6,732	10.9	7,425	11.3
C. & C., C. & St. Louis.....	2,431	4.1	2,319	3.5
Totals.....	61,690	100.0	65,993	100.0

Of the above shipments 5,365 tons were flour, 28,798 tons grain and millstuffs, 8,760 tons provisions, 8,192 tons dressed beef, 1,648 tons butter, 1,182 tons hides, and 4,953 tons lumber.

Shipments via water last week amounted to 137,600 tons, the bulk of which was grain.